

Eighth Annual Navy Workforce Research and Analysis Conference

**Leading the Change: The Research Community
in Navy's Strategic Vanguard**

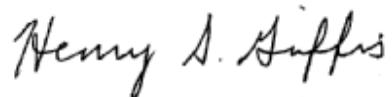
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Contents

Introduction	1
Manpower and Personnel Policy Analysis	5
A Strategic Approach to Humanitarian Medical Manpower Planning	5
The Impact of the Navy’s Tuition Assistance Program on First-Term Retention and Promotion	6
U.S. Navy Officer Off-On Ramps	8
FIT	10
Incomplete Tours: Causes, Trends, and Differences	11
Capability-Based Competencies	13
Navy Workforce Development & Shaping Competency Management: Advances in the Collection and Utilization of Total Force Competency Data	13
Workforce Analysis for an M&S Educational Program	14
FIT by 2010 for the Operational Level of War Capabilities-Based, Competency-Focused Manpower	16
Competency Development and Management in the Acquisition, Technology, and Logistics (AT&L) Workforce Overview	18
Manning Requirements/Strategies	21
Billet Analysis Tool (BAT) Development	21
Alternative Manning Strategies—Approaches Preserving the All-Volunteer Force in a “Flattening World”	23
Navy Manpower Studies: A Methodology for Determining Navy Shore Manning Requirements	24
Manning to the Edge	27
Predict-21 Performance Predictor Tool	27
FUTURE	28
Simulation Toolset for Experimental Environment Research (STEER)	29

Optimized Skills Bank	31
Lightning Poll.	32
Community Requirements and Manning	35
Supply Chain Analysis SEAL/SWCC Community Management Models	35
The Effects of Shore Billets on FC(A) Retention and Promotion.	36
Determining USMC Wartime Medical Requirements	38
Benefits as Part of Compensation	41
Marriage and Military: Does the Compensation Subsidy Induce Higher Rates?.	41
Perceptions and Influence of Quality-of-Life and Retirement Programs.	43
Comparing military and civilian total compensation.	44
Pay for Performance and Game Theory	46
One-to-One Negotiation of Assignment Incentives for Sailors and Commands	48
An Alternative Assignment Incentive Pay Auction Mechanism: An Experimental Analysis	49
SRB Allocation Model	50
OPIS and WebWOLF—Supporting Officer Community Management Using Historic Data and Future Projections	52
Navy Officer Strategic Model	54
Diversity	57
The Navy's Strategic Diversity Effort: An Update	57
Diversity Attitudes and Organizational Outcomes: Are There Group Differences?.	58
CNA Research on Diversity and Demographic Representation in the Armed Services.	60
Why do Male and Female Surface Warfare Officers Leave the Navy? An Analysis of the Individual Ready Reserve	63
Assessing Diversity, Discrimination and Sexual Harassment in the Navy: Results of the Navy Climate Survey.	64

Black and Hispanic Marines: Their Accession, Representation, and Success in the Corps.	66
Quality of Life	69
U.S. Army Morale, Welfare, and Recreation (MWR)	
Program Links to Readiness: The Army Spouse	
Perspective	69
2006 Survey for Spouses of Navy Individual	
Augmentees (IAs).	71
Task Force Life/Work	72
Results of Exceptional Family Member Program	
Quick Poll	74
2006 Active Duty Spouses: Member and Family	
Readiness and Support	76
Enlisted Accession Supply Chain	79
Production Management Office (PMO)	79
Performance-Based Costing	80
Simulation Modeling and Analysis of Street-to-First-Contract-Renewal Supply Chain Network: Aviation	
Mechanical (AMEK) Job Family	83
Military Incentive Tracking, Accounting, and Payment	
System (MILITAPS)	85
Manpower Planning—Modeling and Simulation.	87
Using Optimization in Manpower Planning	87
Hybrid Simulation & Optimization for Navy Manpower	
Planning and Distribution	88
Agent-Based Enterprise Simulation Validation Plan	90
COMPASS: Comprehensive, Optimal Manpower	
Personnel Analysis Support System	92
Safety.	95
Analytical Tools Describing Life-Cycle Costs of Hazardous	
Exposures and Benefits of Risk Reduction	95
Safety capabilities that support efficiency and reduced	
life-cycle costs	97
Enterprise Safety Applications Management System	
(ESAMS)	99

Update on Hearing Impairment Among Navy and Marine Veterans Using VA Data	100
Individual Characteristics That Influence Performance	103
Relationships Between Personality Dimensions Assessed by the Navy Computer Adaptive Personality Survey (NCAPS) and the Big Five	103
SYRUS: Individual Differences in Multitasking Ability	105
SMARTS Measuring Individual Characteristics to Predict Performance	106
An Empirical Method for Determining Destroyer Squadron (DESRON) Team-Based Proficiencies From Task Analysis	108
Recruiting Issues	111
Results of Initiatives to Increase Naval Special Warfare/Operations Accessions	111
Does the strength of the economy affect not just the quantity but also the quality of recruits?	113
Generation Y and Navy Recruiting: Targeting the Next Generation of Navy Civilians	115
Recruit Quality and Enlisted Performance	117
Stress on the Force	119
Assessing the Effects of Individual Augmentation on Navy Retention	119
SELRES Manning in Limited-Supply/High-Demand Skills	121
Career Impact of Active Duty Individual Augmentation . .	122
Community and Strength Planning Models	125
Evolution of the Navy's Strategic Strength Forecasting Model	125
SKIPPER A-School Optimization by Paygrade	126
Enterprise-Wide and Cross-Enterprise Modeling	129
Integrated Operating Picture	129
Enterprise Data Broker: An Approach to Data Consolidation Using a SOA-based Delivery System	130
List of figures	133

Introduction

The Deputy Chief of Naval Operations (Manpower and Personnel) (N1) is committed to improving the effectiveness of research and analysis work done in the manpower and training area. N1 started the improvement process 8 years ago by requesting that CNA organize a conference for the Navy manpower and training community leadership and the research organizations that support that community. Because of the success of the previous conferences, the Navy asked CNA to organize an eighth conference in May 2008. Once again, the goal was to help researchers better leverage their resources, provide more useful products, and improve the overall research program by:

- Improving leadership's understanding of what the research community is doing and can do to help address the issues facing leadership
- Providing a forum in which leadership can articulate its vision of the top priorities for Navy manpower and training
- Improving communication and the links between researchers at different organizations within the community.

The title of the Eighth Annual Navy Workforce Research and Analysis Conference was *Leading the Change: The Research Community in the Navy's Strategic Vanguard*. The conference began with plenary presentations by Ms. Anita Blair, Assistant Secretary of the Navy (M&RA), Acting; RADM William E. Landay III, Chief of Naval Research; and VADM Mark E. Ferguson III, Chief of Naval Personnel. A research panel set the stage for the breakout sessions in which researchers presented their recent work in the manpower and personnel fields.

Ms. Blair began the conference with a presentation on "Developing a Human Capital Plan for the Total Force." Ms. Blair presented the Department of the Navy (DoN) Human Capital Strategy's vision and strategic objective. The vision is "to support the national security and

national defense objectives through strategic management of the department's total Naval force." The strategic objective is "to produce and employ the right people with the right skills, at the right time and place, and at the best value, to support or accomplish 21st Century Naval missions." The total naval force includes active and reserve Navy and Marine Corps members, as well as civilian employees, contractors, and volunteers. Ms. Blair stated the need for a comprehensive Human Capital Research Agenda that brings together the work that must be done, the workers who do it, the processes that turn data and information into useful products and effects, and the structure of the organization. Ms. Blair charged the research community to focus on the big picture and to challenge old models and assumptions.

RADM Landay delivered the conference's keynote presentation, which focused on how the science and technology (S&T) work done by the Office of Naval Research (ONR) affects the areas of manpower and training, focusing on distributed operations and naval warrior performance and protection. RADM Landay noted that some objectives were improved training and education, casualty care and prevention, warfighter protection, and manpower management. He displayed some work on understanding how the human brain works and how the increased understanding could benefit the Navy in many different areas, such as effective training, understanding psychological trauma and how to repair it, assessing human performance and decision-making, predicting job satisfaction, and improving the selection and classification process.

VADM Ferguson followed RADM Landay with a presentation on "The Role of Research and Analysis in Achieving FIT." He defined FIT as "matching the competencies of the Total Force with the requirements of the work to deliver warfighting capability." This notion of FIT allows the Navy to describe how to measure fitting an individual to a billet or a competency set. VADM Ferguson stated that the research community could truly help in moving the Navy toward achieving FIT, and he noted that there have been many past successes where research has helped the Navy with selection and classification problems, including the Navy Quota Management System, the Sea-Shore Flow Algorithm, and Assignment Incentive Pay. The Navy faces challenges, however, in its ability to recruit, develop, and retain the

people who will allow the Navy to achieve FIT. Some of these challenges include the changing characteristics of potential recruits, the propensity to serve, liquidity in the talent market, and external factors, such as the war and the economy.

A final point of VADM Ferguson's presentation concerned the use of pilot programs to put theory into practice. He proposed increasing the use of pilot programs and innovation as a means of trying out proposed ideas without betting the entire Navy on them. Some key parameters of successful pilot programs would be defined parameters, such as scope and duration, and measurable results about what the Navy hopes to achieve. The Navy must also be able to admit when a pilot program has failed and to do an unemotional "autopsy" to determine whether or how the program could be scaled up to fit the larger Navy.

A research panel discussion followed VADM Ferguson's presentation. Panelists included Dr. David Alderton, Navy Personnel Research, Studies, and Technology (NPRST); Dr. Ray Perez, ONR; Dr. Stephen Mehay, Naval Postgraduate School (NPS); and Dr. Henry Griffis, CNA. Mr. Wayne Wagner, N1Z Strategic Affairs Office, moderated the discussion. Each panelist discussed the workforce-related research that his organization is conducting; then two questions were posed: (1) How can research contribute to FIT? (2) Are there opportunities for collaborative research that could help in jump-starting FIT?

The panelists discussed several areas in which research could help implement the concept of FIT. There was a discussion about the barriers to achieving FIT and using research to analyze those barriers. Understanding the issues of propensity to join the Navy, retention and reenlistment decisions, fluctuations in endstrength, and the cyclical pattern of billets are important for achieving FIT. The panelists also discussed the preparation of young men and women joining the Navy, from their academic preparation and voluntary education programs to the cognitive burden on Sailors and the training strategies to best develop them. Research can also help in defining FIT on multiple levels, from platform, unit, or team FIT on up to higher levels of aggregation.

The panelists had some suggestions for increasing collaboration among the different Navy research institutions. Simply sharing information and data are two opportunities for collaboration that could help jump-start the FIT concept. There were also discussions about collaborating on pilot programs and using them heavily to test ideas about FIT.

The research panel set the stage for the breakout sessions, which covered specific workforce topics simultaneously. The 19 breakout sessions listed in table 1 had an average of 4 presentations each, for a total of 78 presentations.

Table 1. Breakout sessions

Session	Breakout session
I	Manpower & Personnel Policy Analysis Capability-Based Competencies Manning Requirements/Strategies Manning to the Edge
II	Community Requirements and Manning Quality of Life Officer Analysis
III	Compensation: Retention Bonus Individual Characteristics That Influence Performance Enlisted Accession Supply Chain
IV	Compensation: Assignment & Performance Incentives Recruiting Issues Community & Strength Planning Models
V	Diversity Benefits as Part of Compensation Manpower Planning—Modeling & Simulation
VI	Stress on the Force Enterprise-Wide & Cross-Enterprise Modeling Safety

Manpower and Personnel Policy Analysis

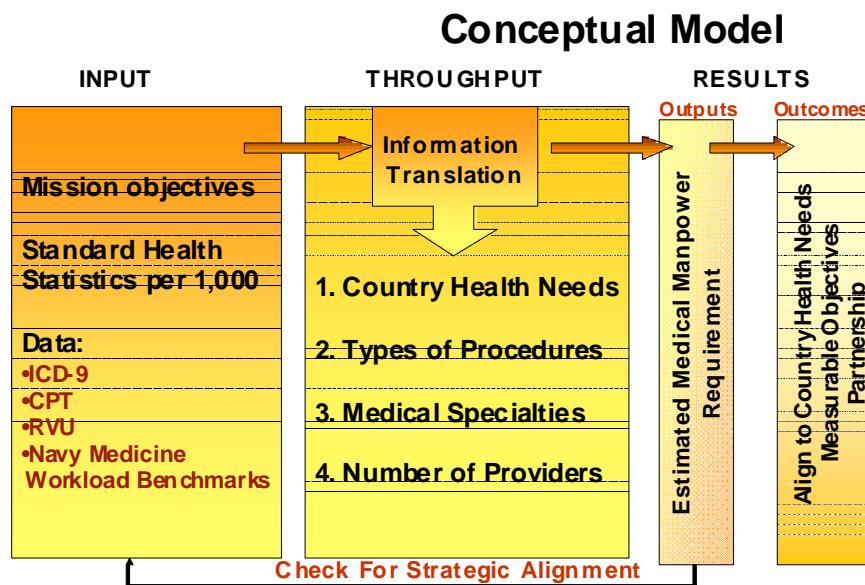
A Strategic Approach to Humanitarian Medical Manpower Planning

LT Kathleen Cooperman (Medical Services Corps, U.S. Navy) and CDR Linda Houde (Nurse Corps, U.S. Navy) gave a presentation on improving medical manpower planning. Medical missions must be prepared to meet traditional operational requirements such as combat casualty, disaster relief and readiness training, and also peacetime country-centric health requirements. The authors explained that current medical manpower determination processes for staffing medical missions are based on the Required Operational Capabilities in the Projected Operational Environment. The current manpower process fails to capture country-centric healthcare requirements associated with peacetime missions.

According to LT Cooperman and CDR Houde, the demand for "soft power tools" to positively influence stability and security has increased interest in Humanitarian Medical Assistance. In response to the need, researchers have developed a country-centric approach, constructing a demand-driven manpower model using standard health statistical indicators. The model draws from the statistical indicators to align medical manpower workload to country health objectives for delivery at the community level. The model framework guides medical planners in identifying mission-essential medical programs and services. It shifts manpower planning from scenario based to country capability and needs assessment, which improves alignment to transformational doctrine. Finally, it creates clarity by using actual standard health statistics, thereby fostering prioritization of medical services and improved coordination with stakeholders, such as non-governmental organizations. The analysts recommend that a country-centric planning approach be adopted to optimize manpower resources and improve overall operational effectiveness.

LT Cooperman and CDR Houde concluded by stating that the model is a starting place for at least five improvements: aligning mission to country need, identification of required medical services, estimating manpower requirements, identifying staffing gaps, and cultivating partnerships.

Figure 1. Strategic alignment of medical missions to country-centric health needs^a



a. Presented by LT Kathleen Cooperman and CDR Linda Houde at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

The Impact of the Navy's Tuition Assistance Program on First-Term Retention and Promotion

Dr. Stephen Mehay (NPS) and Ms. Elda Pema (NPS) presented a study that analyzes the impact of the Navy's Tuition Assistance (TA) program on first-term enlisted personnel. Two prior studies that analyzed the retention effect of the Navy's TA program have produced conflicting results—one finding that participants are more likely to

leave the Navy, the other study finding they are more likely to stay. Dr. Mehay's and Ms. Pema's analysis of this relationship has several advantages over the two prior studies: (1) they use a much larger dataset consisting of multiple cohorts of new recruits, (2) they use data on more recent cohorts, and (3) they apply a quasi-natural experiment to derive the causal effect of the TA program.

Figure 2. Increased retention and cost-effectiveness^a



- The program increases retention by 10% for TA users (~2 points)
- Recent estimates suggest raising retention (via SRB) by 1-point costs \$66 mil. Thus, TA saves Navy about \$132 mil.
- TA annual program expenditures are \$95 mil.
 - Net Benefits = +\$37 mil.

Navy Workforce Conference 2008

16

a. Presented by Dr. Stephen Mehay (NPS) and Ms. Elda Pema (NPS) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

According to Dr. Mehay, the study focuses on first-term Sailors who entered the Navy between 1994 and 2001; they are tracked during their first 5 years of service. The statistical analysis uses Military Entrance Processing Station (MEPS) data on new recruits (provided by the Defense Manpower Data Center (DMDC)), and TA enrollment data (provided by the Navy Center for Personal and Professional Development). The analysis exploits a natural experiment in

the data to control for potential bias that may arise as a result of self-selection of Sailors into the TA program. Specifically, the team uses the fact that some Sailors enroll in college courses but withdraw for exogenous reasons (such as deployments). Researchers identify a control group with the same motivation to use TA as people in the treatment group, but who do not actually complete the program.

The statistical analysis finds that first-term Sailors who use TA to enroll in undergraduate college classes have a significantly higher probability of reenlistment and of promotion than those who do not participate. While these results are robust to the controls for selection, the results indicate that self-selection into the program of more motivated Sailors is likely to explain as much as one-half of the baseline effect of the program on retention.

U.S. Navy Officer Off-On Ramps

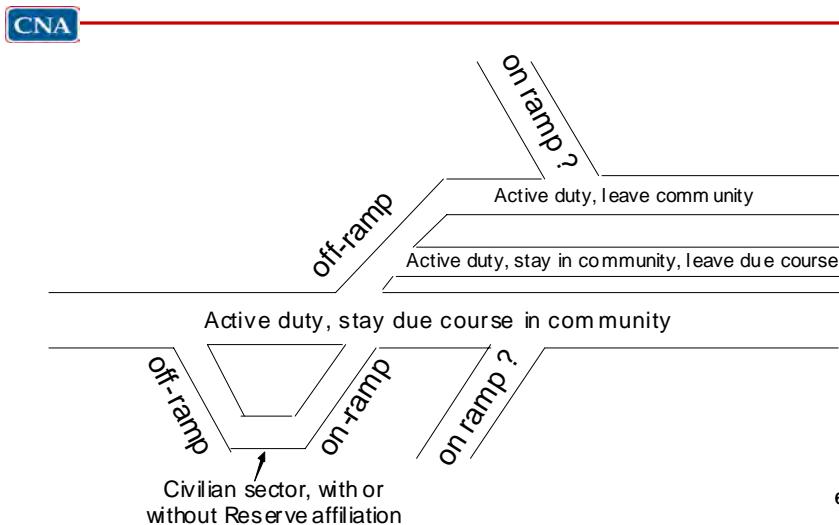
Dr. Ann Parcell presented research findings on questions concerning the potential benefits of off-on ramps for U.S. Navy officers. The research set out to answer a number of questions, including the following: Does having off/on ramps help to manage the force and fill billets? Do off/on ramps improve retention? Can they increase due course Unrestricted Line (URL) retention? Can they address unequal retention of men and women? Are officers who use these ramps as productive as those who stayed on active duty (AD) and in their community continuously?

According to Dr. Parcell, officers present a critical personnel management challenge in that retention rates for women are substantially lower than those for men, particularly in the URL communities. Furthermore, research indicates that traditional retention tools, such as continuation bonuses, do not appear to be closing the gap in the male/female retention rates. Likewise, the observable characteristics that affect female stay/leave decisions do not translate into feasible accession or retention policies. However, survey and focus group results for both male and female officers suggest that taking time away from the active duty career to achieve a better work/life balance could help retention, as long as career progression is not hindered. These breaks in service, called off-on ramps, could help achieve a

better work/life balance and improve retention, although some laws and traditions must be modified to accommodate the off-on ramps.

Figure 3. Breaks in service that may improve work/life balance and retention^a

Notional off-on ramps



6

a. Presented by Dr. Ann Parcell (CNA) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

Dr. Parcell presented two examples of organizations using or considering off-on ramps: the Coast Guard (CG) TEMPSEP program and the Navy Unified Legislative and Budget (ULB) proposal for a pilot program. Past research by Dr. Parcell has revealed male/female retention rate differences in the Surface Warfare, Judge Advocate General, and Meteorology/Oceanography communities. According to Dr. Parcell, although the retention patterns are different across the communities, and community leaders cite different management challenges, researchers have concluded that all three communities could benefit from off-on ramp programs.

FIT

Dr. David Rodney (CNA) discussed one of the Navy's primary goals for 2008: delivering FIT. FIT is a total force concept, centered on the idea of delivering the right Sailor to the right job, at the right time. Dr. Rodney explained that the right Sailor has the appropriate mix of knowledge, skills, and abilities to match the demands of the assignment; the right job/right time refers to both operational unit schedule and the right point in the Sailor's career.

Figure 4. FIT & FILL measures are concise but are they enough?^a

Are FIT & FILL “right”?

CNA

- **Currently, we measure enlisted FIT and FILL by considering overall unit manning**
 - E.g., YN P-9 BA is 8 E-7s & 2 E-4s, COB is 6 E-7s & 3 E-4s
 - FIT = 80% and FILL = 90%
- **The Navy is considering an initiative to move towards Billet Based Distribution**
 - This will / may change measures of FIT and FILL. Will new measures be “better”?

a. Presented by Dr. David Rodney (CNA) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

According to Dr. Rodney, it is not easy to measure FIT because so many possible measures and issues need to be addressed. Measures of FIT and FILL provide Navy leadership with some concise metrics that capture how well the Manpower, Personnel, Training & Education (MPT&E) enterprise is performing. FIT and FILL are measures of “current” unit manning. The following are some of the questions surrounding these measures. Are FIT and FILL the “right” measures of

unit manning? Should we use additional measures of the distribution process? Should we use other measures of the MPT&E processes? What are long-term measures of the MPT&E processes? What are performance standards? Dr. Rodney said there are long-standing desires to relate resources to operational readiness; while we can measure unit FIT and FILL, tactical readiness is not as well understood, so how to relate unit manning to tactical readiness is another issue.

Dr. Rodney concluded that FIT and FILL are important measures of the current output of the MPT&E processes. Navy leadership needs a concise number of other metrics that capture the entire spectrum of current MPT&E performance and how well MPT&E is preparing for the future. Furthermore, performance standards are needed for all metrics. Finally, a better understanding is needed of the relationship between personnel and operational readiness.

Incomplete Tours: Causes, Trends, and Differences

Dr. Martha Koopman (CNA) and Mr. Dave Gregory (CNA) presented a study on incomplete sea tours. The purpose of the study was to determine the extent to which enlisted tours of duty are completed and to address the concern that completion rates are strikingly low. The study team examined what causes incomplete tours and variations over the type of tour.

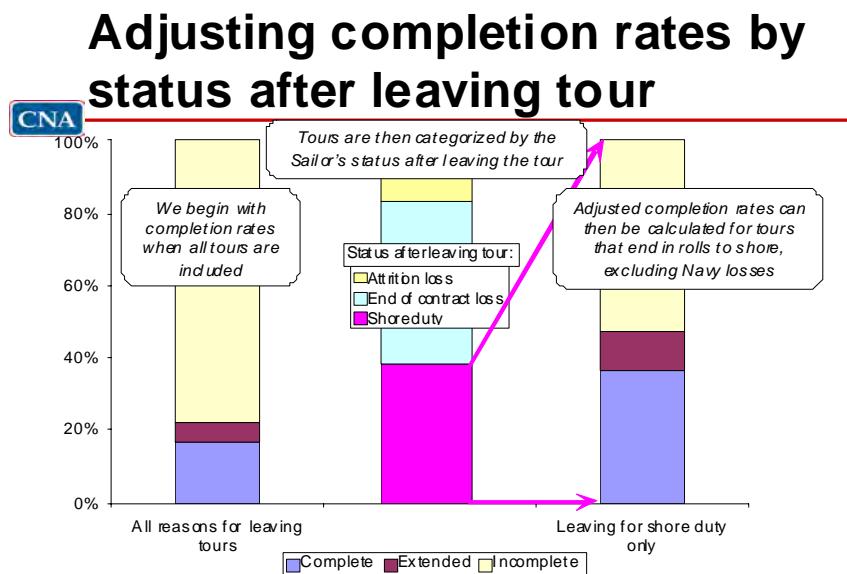
Dr. Koopman found in a previous CNA study that, overall, 67 percent of tours were incomplete, and this percentage increases with tour length. Most of the incomplete tours were terminated by a Navy loss. Also, there was a response to sea pay in that an increase in monthly sea pay decreased incomplete tours. The team presented the results during the briefing. Dr. Koopman explained that “complete” vs. “incomplete” is an imperfect metric. A better metric is the average amount of sea duty per tour. Whether tours are incomplete due to Navy losses or rolls to another type of duty is also important.

Explaining the methodology, Dr. Koopman said that a tour begins when a Sailor changes type of duty (shore to sea or sea to shore). At that point, Prescribed Sea Tour (PST) lengths by occupation and pay-grade were assigned from a Navy instruction to determine the

Projected Rotation Date (PRD). Next, the Sailor is tracked until he/she leaves the tour. The tour ends because the Sailor either leaves the Navy or moves back to shore duty. If the Sailor leaves the tour within a window around the PRD, the tour is complete. The two data sources were CNA's longitudinal manpower files, which allowed researchers to identify and track actual tours, and the Navy instructions that give PSTs by occupation and paygrade.

The results indicated that sea tours end because of Navy losses, either end of contract or attrition, or rolling to shore duty. The policy goal is to generate more years of sea duty. Increasing mandatory sea duty is not an effective strategy, but combinations of sea pays and reenlistment bonuses are cost-effective. New incentive pays are promising, especially Sea Duty Incentive Pay (SDIP). Dr. Koopman concluded with four recommendations. First, know why tours aren't being completed. Second, avoid prescribing longer mandatory tours to increase sea time; this does not seem to be effective. Third, use appropriate combinations of sea pays and SRBs as incentives to increase sea time voluntarily. Finally, continue to use and evaluate SDIP.

Figure 5. Identifying Sailor's status at end of tour^a



a. Presented by Dr. Martha Koopman (CNA) and Mr. Dave Gregory (CNA) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

Capability-Based Competencies

Navy Workforce Development & Shaping Competency Management: Advances in the Collection and Utilization of Total Force Competency Data

A presentation by Ms. Lisa Gabel (HPC) and Dr. Burt Krain (HPC) (MPTE Orlando) outlined an efficient and effective methodology that builds on previous efforts to collect competency data based on a "best practices" model developed by the Navy's Human Performance Center over the past 4 years. In light of scarce resources—changes to the Navy's Civilian Personnel System via the National Security Personnel System (NSPS), an emphasis on "jointness" and interoperability of Total Force resources, and economies of scale—a top-down, deductive approach was engineered to capture competency data for a wide range of human resource applications.

The HPC model collects and validates the content of both technical and behavioral competencies. Using a framework built on established crosswalks to the Department of Labor's (DOL's) Occupational Network (O*NET), efficiencies can be realized by concentrating on those occupations that are primarily military and undocumented by DOL, while capitalizing on work already documented.

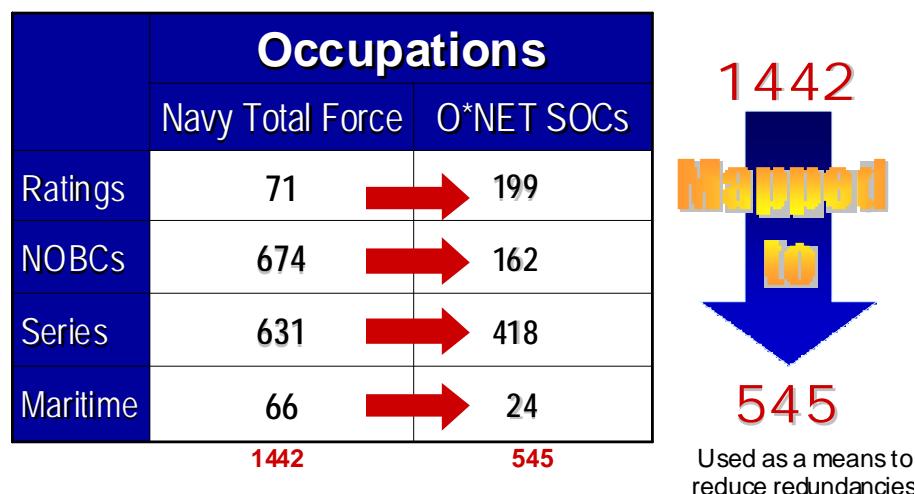
Ms. Gabel and Dr. Krain explain that the model uses a hierarchical architecture in which military and civilian occupations are categorized into notional clusters. Then each cluster is systematically broken down into logical groupings where competencies could be assigned or developed.

According to Ms. Gabel and Dr. Krain, the resulting competency structure is sound, cross-functional, and descriptive, using competency titles, tags, and descriptions while capturing work structures, including knowledge, skills, abilities, work context, and other

characteristics. The resulting model provides competencies that are descriptive, interoperable, and represent a comprehensive view of the Total Force, driven by competencies and their applications. Work on capturing these data is continuing.

Figure 6. Navy to O*NET crosswalk of occupations^a

Crosswalk Results



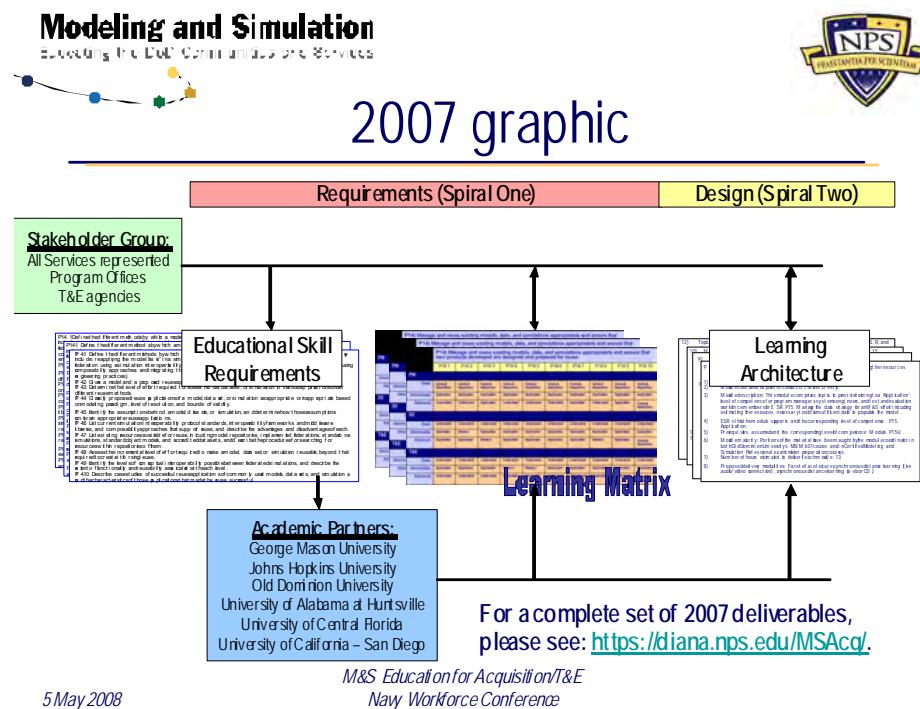
a. Presented by Ms. Lisa Gabel (HPC) and Dr. Burt Krain (HPC) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

Workforce Analysis for an M&S Educational Program

Dr. Dave Olwell (NPS) reported that Modeling and Simulation (M&S) is not realizing its potential for cost savings in DoD for the following reasons. First, customers of M&S do not know how to employ M&S effectively. The challenges are often which tools to use, when to use them, how to use them, and how to get them. Also, customers of M&S do not understand the risk and benefits of using M&S. He stated, however, that education can help drive wider acceptance and better use.

The approach Dr. Olwell promotes is to identify requirements using a wide set of stakeholders for a focused initial audience. The acquisition audience should be first because it provides a substantial number of workforce members with budget control of more than \$150 billion per year. The next step is to survey existing U.S. educational programs to identify gaps. It's then necessary to develop educational offerings to cover gaps using the best U.S. university programs. Next, make them widely available through the web, Defense Acquisition University (DAU) Continuous Learning Modules (CLMs), university courses, short courses, and public domain. Finally, it's necessary to track return on investment longitudinally.

Figure 7. M&S education for acquisition: requirements and design^a



a. Presented by Dr. Dave Olwell (NPS) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

Dr. Olwell stated the following benefits of the M&S Educational Program. The program provides comprehensive education focused on consumers of M&S. Partnering with government and academia presents an opportunity to influence the culture of M&S education. The M&S program will improve workforce capabilities across all Services, activities, and programs that use M&S. Potential savings for DoD will be realized from increased use of M&S in acquisition. All learning materials created from the project will be public domain. The program is constructed in a way to facilitate reuse with 80 percent of course materials supporting all six communities.

Dr. Olwell concluded that the current path will result in products that provide the education and training that acquisition and Training & Education (T&E) professionals need to use M&S effectively in their jobs.

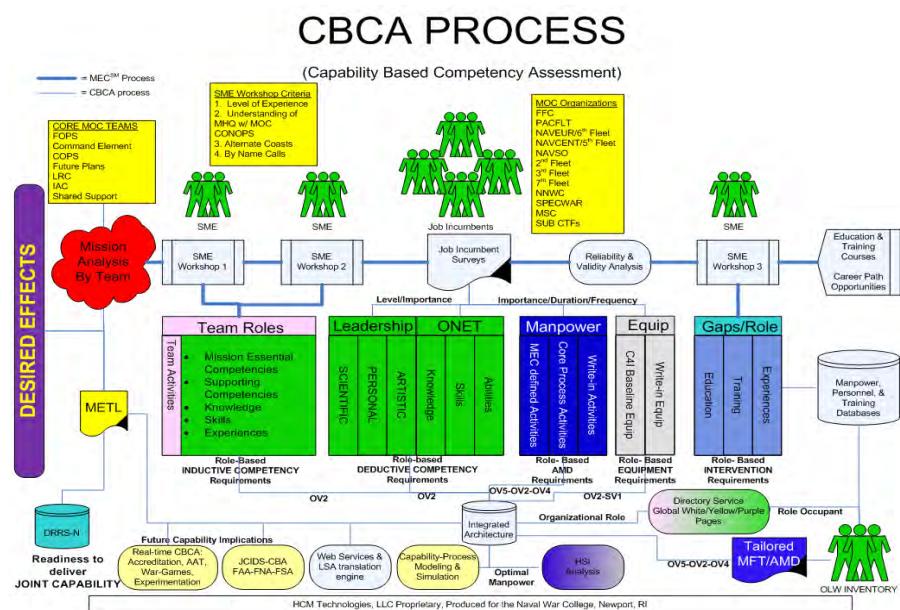
FIT by 2010 for the Operational Level of War Capability-Based, Competency-Focused Manpower

Professor Richard Suttie and Mr. Nicholas J. Potter, College of Operational and Strategic Leadership (COSL), Naval War College (NWC), Newport, RI, presented a study that developed a methodology for determining competency-based manpower, personnel, training, education, and experience requirements from a Capability-Based Analysis (CBA) as defined by the Joint Capabilities Integration and Development System (JCIDS). The study used Maritime Headquarters Command with Maritime Operations Center (MHQ w/MOC) as a use case to analytically ascertain role-based competencies needed at the Operational Level of War as determined by job task analysis based on work processes.

According to Professor Suttie, guiding principles restricted research to existing methodologies, schemas, and technologies that have the most utility throughout Navy, Joint, Multinational, Interagency, and NGO partner domains. The Mission Essential Competency (MECSM) process developed by the Air Force Research Lab is the analytically reliable and valid method used as the core to the overall methodology to define mission-focused role-based inductive competency

requirements. This process includes a detailed training gap analysis developed through a series of Subject Matter Expert (SME) workshops and job incumbent surveys. Significant to achieving the research objective were follow-on steps to enhance the MECSM core process with deductive competency data and concurrent workload analysis to create total manpower requirements that directly feed integrated architectures (DoDAF) created through a JCIDS CBA. The Capability-Based Competency Assessment (CBCA) methodology was tested using the Future Operations (FOPS) cell of the Navy's MHQ w/MOC as an initial pilot.

Figure 8. The full approach CBCA process^a



a. Presented by Professor Suttie (COSL) and Mr. Potter (NWC) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

Professor Suttie and Mr. Potter reported that preliminary results from the FOPS pilot convinced the Fleet Governance Board for MHQ w/ MOC to require the CBCA approach to determine the manpower

requirements for all operational teams within a MOC. Outcomes include the ability of manpower requirement analysts to understand the work, workload, and worker requirements of each functional role as expressed by the process/task relevance, importance, frequency, and duration; the relevance, importance, and level of each competency; and enabling educators and trainers to understand how courses (intervention) do or do not provide MOC personnel required competencies. The final product associated with this work will be an ability for educational and training commands to map their learning objectives to CBCA-derived competencies and thereby enhance career development objectives.

Competency Development and Management in the Acquisition, Technology, and Logistics (AT&L) Workforce Overview

Mark Tregar (CNA) presented a CNA study for DAU in which competency models were developed for each of the primary career fields within the AT&L workforce. In the most recent AT&L Human Capital Strategic Plan (v 3.0), the Defense Acquisition University outlined a human capital agenda of competency development, assessment, and analysis to assist senior leaders in developing workforce strategies to improve certification, training, and development for the more than 120,000-member AT&L workforce.

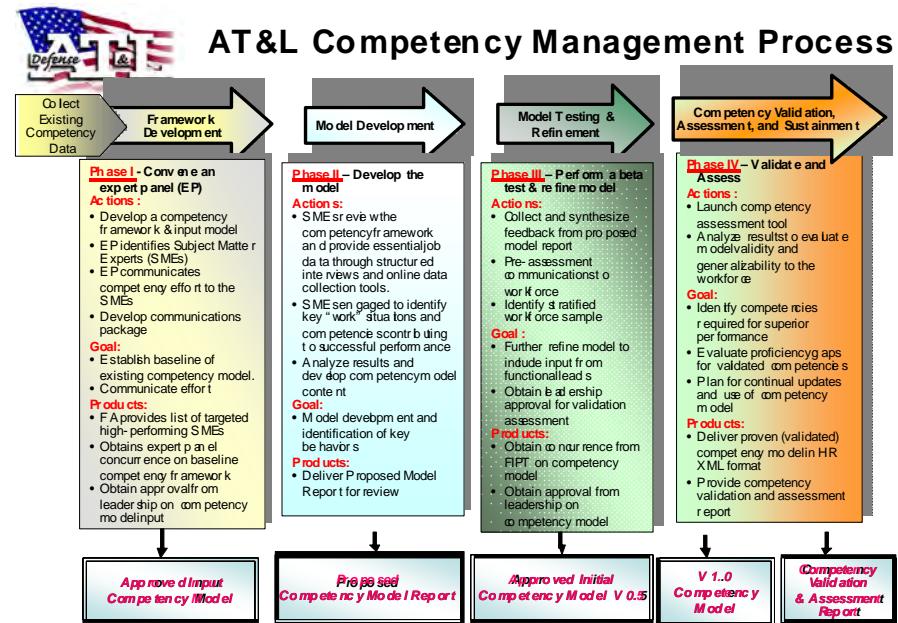
To develop the competency models for the AT&L workforce, CNA created a research-based, four-phase competency development and management process approved by the Office of Personnel Management (OPM). This process used a variety of levels of subject matter experts for a variety of purposes. Mr. Tregar's presentation provided details of the process and its outcomes, as well as the ongoing analysis within the Contracting, Life Cycle Logistics, and Program Management communities.

Mr. Tregar stated that competency development begins by using a group of experts in the field to form an expert panel and then progresses to an online data collection phase using SMEs from across the DoD. The final phase of the competency development and

management process entailed a final validation and workforce assessment of the competency model. Validation of the competency models will enable the use of the model for future training modifications, workforce measurement, and overall human capital strategic planning.

Mr. Tregar concluded by stating that competency-based management depends on the ability of the community to collaborate to identify the competencies needed each day on the job to perform successfully. He said using a competency-based management system that is specific to the needs of the AT&L workforce will help organizations focus training dollars, reduce turnover costs, create shorter recruiting cycles, and build employee awareness about what the agency values in its people.

Figure 9. Phases of the AT&L competency management process^a



a. Presented by Mr. Mark Tregar (CNA) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

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Manning Requirements/Strategies

Billet Analysis Tool (BAT) Development

Mr. Steven Belcher (CNA) presented the Billet Analysis Tool (BAT) POM 08 Build, which was developed by CNA in response to the Navy's expressed need to be able to quickly produce manpower excursion estimates for Total Force planning within and beyond the Future Years Defense Program (FYDP). The Navy wants the capability to rapidly calculate manpower requirements for different force structure scenarios (to include costing data) within and beyond the FYDP. In addition, the Navy wishes to have community management drill-down capability (view requirements by rating/designator and paygrade).

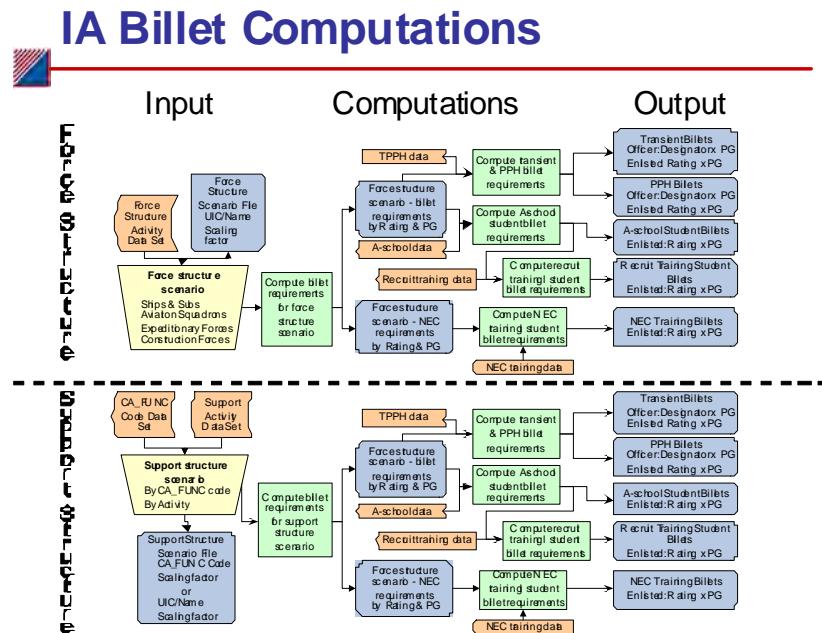
The BAT was developed as a Microsoft Access desktop application without the need for NMCI technology. It enables manpower analysts to quickly compile, filter, and analyze Total Force Manpower Management System (TFMMS) manpower requirement data. It contains future Unit Identification Codes (CVN-21, DD(X)) to allow analysis beyond the FYDP. Furthermore, BAT sorts and displays output by appropriation—MPN, RPN, Civ; manpower type—AC, FTS, SELRES, Civ; rating/EMC/designator and paygrade; enterprise; and inherently governmental/commercial activity (IGCA) functions. The BAT tool is managed by WB&B, and TFMMS data are updated monthly.

According to Mr. Belcher, the original BAT design works by first defining the scenario, computing manpower requirements and costs, and building output reports produced in Excel. Rising manpower costs and declining endstrength authorizations, however, have elevated the importance of total manpower requirements and costs in assessing force structure alternatives. Current assessments look only at manpower requirements of force structure units (e.g., if the Navy decommissions four destroyers, billets on the ships go away). Current BAT supports this analysis.

Mr. Belcher states that there is a need to assess the manpower effects of force structure changes within the shore infrastructure. For example, if the Navy decommissions four destroyers, where should shore manpower requirements decrease and by how much?

According to Mr. Belcher, end users identified additional features and capabilities that would improve the tool's value and expand the range of issues it can address. He stated that the original BAT will be operational and available on the WB&B website (with N12 approval). TFMMS data are updated monthly, and other data are updated as available, including pay tables. The enhanced BAT with integrated shore/support module will be completed by October 2008.

Figure 10. BAT Individual Augmentee (IA) billet computation process^a



a. Presented by Mr. Steven Belcher (CNA) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

Alternative Manning Strategies—Approaches Preserving the All-Volunteer Force in a “Flattening World”

Mr. Steve Bills (SERCO), discussed how many cost-cutting notions, some radical, are being considered as part of the solution to own and operate the fleet with sufficient size and capability to meet anticipated warfare, and now humanitarian, commitments. One manpower consideration is a revised sea-shore rotation paradigm. Mr. Bills stated that sending electronics technicians and machinist mates to recruiter duty, for example, fulfills the necessity for Navy-managed staffing ashore but disrupts individual professional technical development. He suggests that, if technical ratings could be sent to more pertinent public or private shore assignments, their professional acumen would be enhanced, productivity would increase, and retention of a more sophisticated workforce could be achieved. He said that recruiting, usually not a natural interest of Sailors, could be executed by others. The Army has already successfully outsourced large recruiting segments. Contractor recruiters, using incentive-based contracts, have proven successful in a variety of venues.

According to Mr. Bills, even more radical practices are in operation in allied navies. Private-sector entities provide financing for vessel construction in return for long-term, metrics-based contracts for operations and maintenance. For example, he said that the Royal Navy entrusts its port services infrastructure to contractors who procure yard craft and then operate them. The Royal Australian Navy awarded contracts for privately funded construction, life-cycle support, and limited operations of coastal patrol vessels. His research indicates that significant advantages in uniformed crew optimization and enhanced operational availability are achieved.

Mr. Bills concluded by stating that building and sustaining an affordable 313-ship fleet requires unprecedented creativity. He believes that the Army’s successes in outsourced recruiting are a good demonstration, including recruiter production, lower life-cycle costs, warfighter productivity, performance-based contracting, and significant successes in such areas as medical recruiting.

Figure 11. Opportunities for optimal Sea-Shore rotations^a

Private Sector Assignments		
(Assumes legal and administrative execution details can be overcome)		
Advantages to Sailor	Advantages to Navy	Advantages to Industry
<ul style="list-style-type: none">■ Technology Growth■ Technology Transfer and Collaboration■ Opportunity to Work in Area of Expertise■ Possible Geographic Advantages■ Family Refresh	<ul style="list-style-type: none">■ Retention Probability Improves■ Embedded Understanding of Private Sector■ Products Tailored for Military Use■ More Sophisticated Technical Workforce■ May Offset Personnel Costs■ Builds Intellectual Capital	<ul style="list-style-type: none">■ Drug-Free, Dependable Employee■ Two-Way Collaboration (better products)■ Ability to Contribute to National Defense



13

a. Presented by Mr. Steve Bills (SERCO) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

Navy Manpower Studies: A Methodology for Determining Navy Shore Manning Requirements

Dr. Don Birchler (CNA) gave a presentation on CNA's experiences with conducting two large manpower estimation studies. Both the Army Test and Evaluation Command (ATEC) and Navy JAG needed timely estimations of current and future workforce requirements, distribution, and analysis of organizational structures. The general approach for these studies was to examine the following: How many hours do personnel work? What types of tasks do they do? How much time do they spend on certain types of products? What changes are expected in the near future that need to be considered?

According to Dr. Birchler, the first part of the analysis is to fully understand the organization of the command in terms of how personnel actually view themselves in the chain. The second part of the

methodology is understanding clearly the types of personnel that exist in the command and categorizing them appropriately but without excessive detail. This step also involves understanding the relational issues between personnel and the command (e.g., aging workforce issues). Step three of the methodology entailed understanding changing operational contexts and the future workload (e.g., Base Realignment and Closing (BRAC) consolidation and workforce cuts).

The next step involved creating task lists and product areas by gathering data through a workload diary survey to learn how personnel spend their work hours. Analyzing the tasks lets us know if the people are doing jobs within their area of expertise. Highlighting areas where people are “swimming out of their lanes” shows where a possible manpower deficiency exists. This analysis leads to a quick look at whether people are being used in the most efficient manner.

Figure 12. Analysis of task hours^a

Quick Look – Navy Legal Service Office (NLSO)

NLSO Officer Table	Admin	Exec/ Exec Support	Instructor	Legal	Other	Res Mgmt	Security	Tax	Training	Travel	Grand Total
Defense Counsel	84.5	19.5	13	402	273			1	17	20.5	880.5
Executive	61.5	98.5	1.5	42.5	210.5	1.5	2		22	60.5	505.5
Legal Assistance Attorney	57.5	38.5	2.5	256	145.5			9.5	9.5	2.5	521.5
Total Hours	203.5	156.5	17	700.5	629	1.5	2	10.5	48.5	83.5	1852.5

NLSO Officer Table	Admin	Exec/ Exec Support	Instructor	Legal	Other	Res Mgmt	Security	Tax	Training	Travel
Defense Counsel	10%	2%	2%	48%	33%	0%	0%	0%	2%	2%
Executive	12%	20%	0%	8%	42%	0%	0%	0%	4%	12%
Legal Assistance Attorney	11%	7%	0%	49%	28%	0%	0%	2%	2%	0%

Analysis of the task hours allows us to see if personnel are working in their own “swim lanes”.

a. Presented by Dr. Don Birchler (CNA) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

Dr. Birchler stated that analyzing the product areas reveals what products or services are demanded most. This analysis indicates the amount of resources devoted to a certain product area and allows and examination of tradeoffs between manpower and services. It also reveals how many hours are devoted to overhead “products,” such as command support.

In the next step, each product or service area was assigned a type of rule to forecast the future workload. This most difficult and controversial part of the study used training and exercise events and other proxies to establish forecast rules. CNA then used COMPASS software to conduct field surveys. Finally, the actual manpower requirements were calculated based on the survey data. Dr. Birchler discussed some of the methodological issues, such as not accounting for changes in efficiency, lack of historical data for new initiative, fungibility of work across people, and backlog issues.

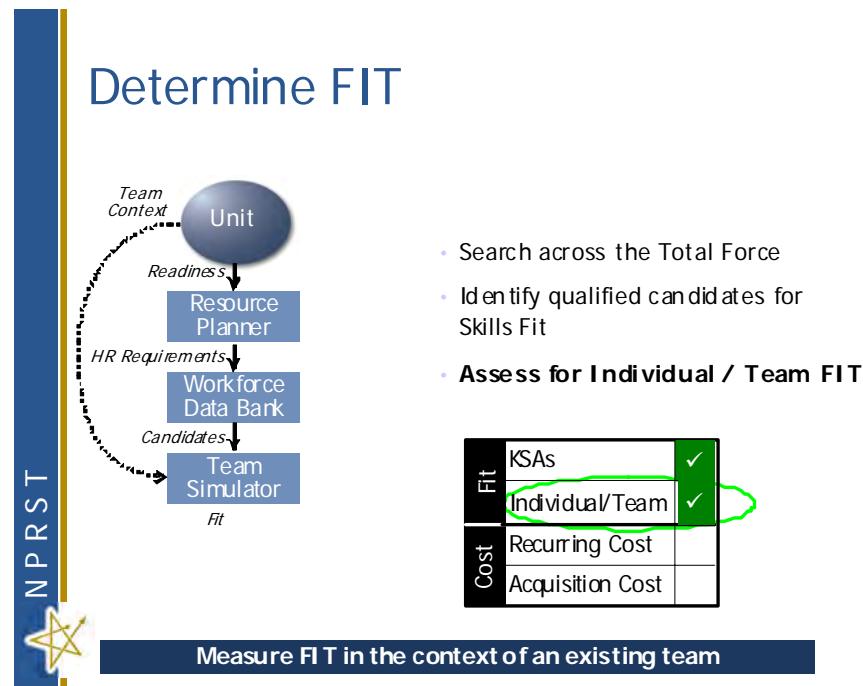
Manning to the Edge

Predict-21 Performance Predictor Tool

Dr. Randy Brou (NPRST) began his discussion by stating that the Navy is undergoing technological and organizational changes in order to become the capability-focused and competency-based workforce that has been envisioned. Among these changes is the shift to focusing on team performance over individual performance. Dr. Brou said that, in the past, assessment of Navy team performance has been primarily qualitative in nature (e.g., supervisory ratings, White & Nebeker, 1996). However, quantitative metrics are needed if the Navy is to be able to assess and predict competency-based team performance. He said there are two important steps that must be taken to provide the Navy with sound methods of obtaining quantitative team performance metrics. They include the development of team skill acquisition models and reliable assessment tools.

Dr. Brou said that there is a significant body of research investigating various team processes (e.g., Jackson & LePine, 2003) or aspects of team performance (e.g., Harrison et al., 2003), but few efforts have been made to systematically link individual and team characteristics to the effective development and execution of team processes that are shown to lead to superior team performance. He believes that the Predict-21 project will address this gap directly by executing a series of experiments and using data collected to inform models of team skill acquisition. Further, Dr. Brou reports that the use of virtual testing environments has been suggested as a means of overcoming the difficulties inherent in obtaining quantitative team performance metrics (e.g., Loomis, Blascovich, & Beall, 1999). The Predict-21 project will develop such a virtual environment as a reliable tool for team performance assessment.

Figure 13. Modeling team skill acquisition^a



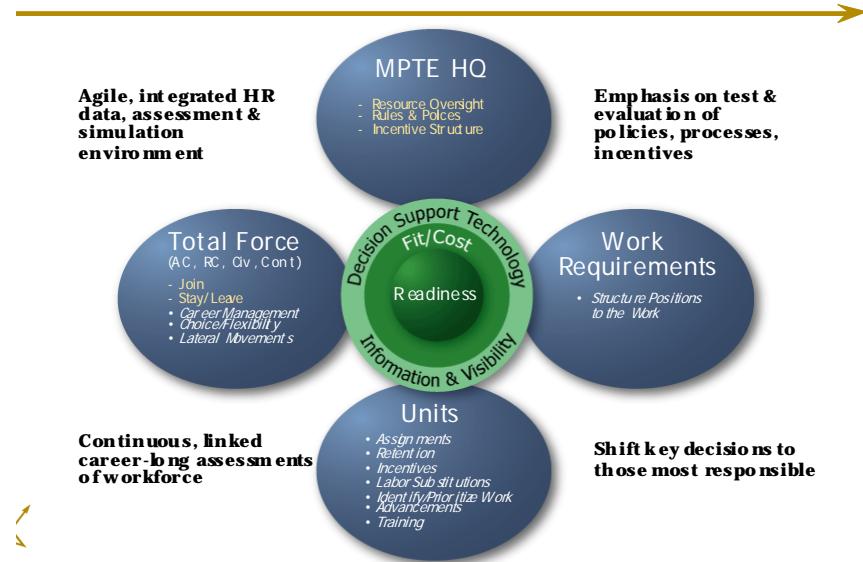
a. Presented by Dr. Randy Brou (NPRST) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

FUTURE

Dave Cashbaugh (NPRST) discussed Force Utilization Through Unit Readiness and Efficiency (FUTURE), a 5-year research and development program that blends behavioral research and economic theory in a virtual experimental environment. It employs artificial intelligence and optimization techniques to create simulation-based decision support tools to determine resource allocation and cost-benefit determinations across units and battle groups. It is composed of a web-based suite of tools that house a multifaceted simulation environment to assess the impact of alternative human resource allocation policies on individual, team, and unit efficiency and readiness. According to Mr. Cashbaugh, the FUTURE tool encompasses the following steps: determine unit staffing requirements (knowledge, skills, and abilities (KSAs)), search across the total force for qualified candidates (skills fit), determine candidates' initial cost estimates, compare qualified candidates, and negotiate for optimal fit/cost.

Figure 14. Making more informed decisions about resource allocation and cost-benefits across units and battle groups^a

Our Vision: Enhanced, Integrated HR Decision-making



4

a. Presented by Mr. Dave Cashbaugh (NPRST) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008

According to Mr. Cashbaugh, this research provides unprecedented visibility over costs, enables the Navy to decentralize its human resources management, and creates a much deeper understanding of how policies and incentive options affect member behavior. He concluded by stating that, with greater visibility and control over input costs, and given the tools they need to analyze the cost implications of their decisions, operational commanders will be guided toward making decisions that optimally trade off readiness, cost, and risk.

Simulation Toolset for Experimental Environment Research (STEER)

CDR Thomas Jones (NPRST) described one of the initial projects designated to be developed under the FUTURE program called

Simulation Toolset for Experimental Environment Research (STEER). CDR Jones explained how, through simulation and modeling of market-based personnel policies, STEER will strategically structure incentives and labor-capital combinations to improve overall Navy effectiveness and maximize return on investment. STEER will provide economic analyses that will serve as a guide to Navy decision-makers and enable users to make the most efficient choices between alternative forms of labor (i.e., military, civilian, or contractor) to meet the needs of their commands.

Figure 15. Decentralizing resource allocation decisions^a



Operational Problems that STEER Addresses

- Readiness is currently obtained with little knowledge of labor-capital substitution and the incentives needed for resource efficiency
- Lack of adequate DSTs for unit & personnel negotiation to jointly optimize resource allocation decisions across multiple stakeholders
- STEER will allow us to
 - Gain Visibility—current limited visibility and control of Navy business processes
 - Understand the tradeoffs—Visibility of tradeoffs between readiness, cost, and risk
 - Forecast—Improve understanding of how policy changes impact individual, unit and enterprise readiness, cost and risk

4

a. Presented by CDR Thomas Jones (NPRST) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

According to CDR Jones, STEER will develop an agent-based simulation platform that uses multiple incentive structures to align individual readiness and resource allocation decisions with organizational Navy objectives. He said that STEER will provide enterprise visibility over the cost drivers of mission readiness in support of the CNO's

desire for a decentralized, efficient, and effective Navy. It will offer a flexible suite of integrated simulation models that allows decision-makers the ability to evaluate the effects of various incentive structures on resource allocation decisions by simulating the long-run outcomes of policy implementation.

CDR Jones said that the objectives of STEER support are integrated with the objectives of all FUTURE and PISCES projects. All objectives will be integrated and synchronized via a common IT architecture that includes a standardized data "schema" or data dictionary for all integral data entering the STEER simulation toolset from any project.

Optimized Skills Bank

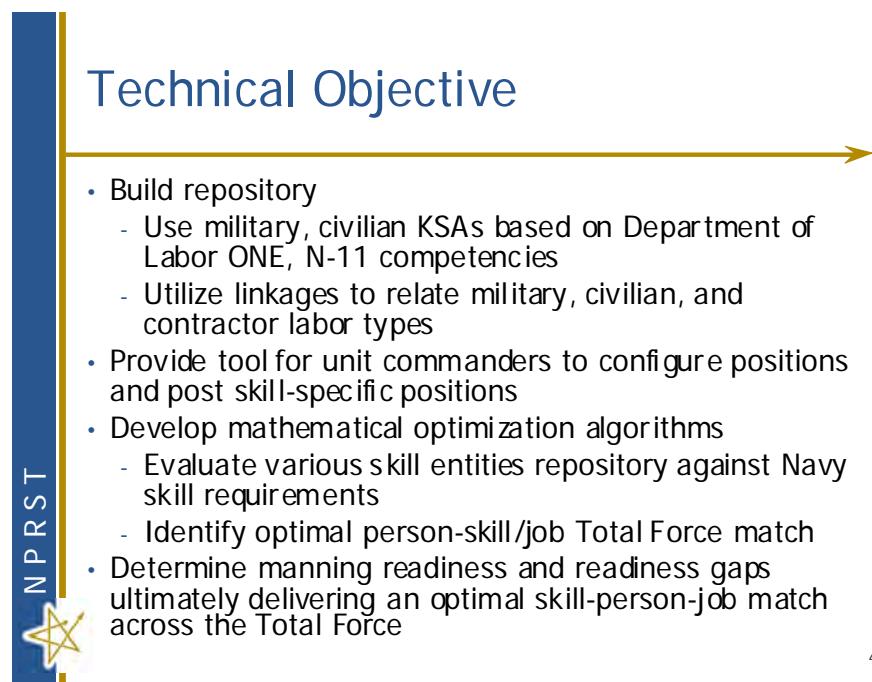
Dr. Janet Spoonamore (NPRST) led a discussion on the Optimized Skills Bank (OSB), a research project funded for FY08-10 within the ONR—sponsored by the Future Navy Capability (FNC) Capable Manpower Force Utilization Through Unit Readiness and Efficiency (FUTURE) program. Dr. Spoonamore said that the OSB will prototype a repository that relates all known skill entities (e.g., KSAs, Department of Labor O*NET classifications) possessed by each category of Navy personnel assets. The program addresses the following operational problems: a web-based job marketplace is lacking, the marketplace needs the capability to serve the Total Force, common classifications are required (e.g., KSAs, links), and tailoring and optimized scheduling is required.

According to Dr. Spoonamore, the prototype repository will serve as a "crosswalk" to relate military, civilian, and contractor labor types and will provide a mechanism allowing unit commanders to post skill-specific positions and update their units' skill profiles.

A crucial element of this effort will be to break down position workload by individual skills, which will enable more efficient matching of personnel assets to skill requirements, and thus post vacant skill requirements as individual requirements or as a new position. OSB then employs mathematical optimization algorithms that evaluate the various skill entities repository against the Navy's necessary skill requirements and identify optimal person-skill/job Total Force

match at the individual and command levels. Dr. Spoonamore concluded the discussion stating that the OSB will determine manning readiness and readiness gaps, ultimately delivering an optimal skill-person-job match across the Total Force.

Figure 16. Accessible, usable, tool for Total Force skill-person-job matching^a



4

a. Presented by Dr. Janet Spoonamore (NPRST) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

Lightning Poll

Ms. Zannette Uriell (NPRST), Ms. Evangeline Clewis (NPRST), and Dr. Paul Rosenfeld (NPRST) began by noting that, along with technological advancements and internet access improvements within the Armed Forces, web-based surveys can be administered in a shorter time and with lower costs than traditional mailout surveys. The main disadvantage associated with web surveys, however, is limited access.

Ms. Uriell and the team discussed how part of the ONR-sponsored DCA research effort is evaluating alternative ways of collecting data to bridge this gap in access, with one possibility being to conduct surveys through text messaging on cell phones. The team provided background information on the prevalence of cell phone use by Navy personnel. The researchers presented “Lightning Poll,” a quick, electronic data collection method that uses text messaging to provide near-instantaneous responses to survey or short poll questions, and plans to conduct a Lightning Poll of recruiters as well as the Total Force.

Figure 17. Total Force surveys conducted through a lightning poll^a

How Does a Lightning Poll Work?

- Respondents notified of poll topic and sponsor, as well as Privacy Act
 - Through non-cell phone means
- Research computer (computer with special software that is attached to a modem and cell phone/SIM card) sends question to cell phones of all respondents
- Message stays on cell phone until respondent takes action (reply, delete, etc.)
- If response received, next question sent to cell phone
- Process continues until end of survey
- Navy personnel data (e.g., gender, paygrade, community) may be matched to responses prior to analyses



10

a. Presented by Ms. Zannette Uriell, Ms. Evangeline Clewis, and Dr. Paul Rosenfeld (NPRST) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

The technical approach required researchers to conduct (a) a Short Message Service (SMS) survey of CNRC recruiters (May 2008), (b) a technology survey to gather data on technology used at home by the Total Force (TF) that can be leveraged for other data collection

efforts (July 2008), and (c) concurrent TF-wide SMS surveys for those who opt to participate (based on the technology survey of July 2008).

Current research studies have indicated that the use of cell phones is increasing in the United States as well as worldwide; in some countries, more people use cellular phones than use the Internet. Some Navy populations have cell phones for work and are allowed use of text messaging on those cell phones, so conducting a survey through text messaging is a conceivable option.

Ms. Uriell and the research team discussed the following two risks: lack of knowledge of cell phone numbers for the TF, and concern that few will be interested in participating in an SMS survey Navy-wide. However, the payoff would be that the Navy will have increased knowledge of venues for data collection (and suggested populations) and what information may be collected through SMS, as well as how quickly results can be available with an SMS survey. The deliverables for this effort have included briefings to CNRC and N-134, reports on the viability of SMS surveys, and a journal article of the results.

Community Requirements and Manning

Supply Chain Analysis SEAL/SWCC Community Management Models

Mr. Chris Brose (CACI, Inc.) discussed a top-level systems model, supply-chain approach that provides the ability to quickly simulate various scenarios/policy issues. The model can also assist in the evaluation of MPTE policies on career path and the ability of the system to fill the required operational billets, and in finding the leverage areas and constraints within the system.

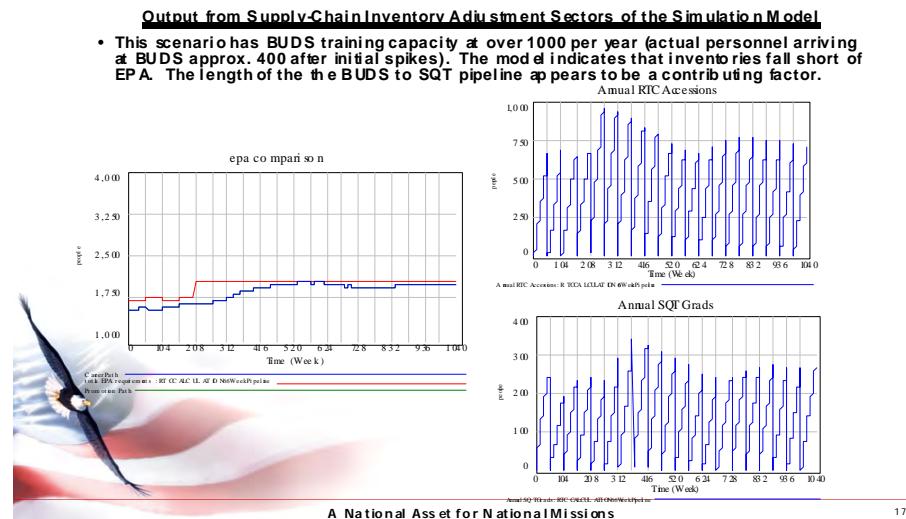
Mr. Brose explained that the objective for the project was, first, to develop a computer simulation model that supports analysis of the Sea, Air, Land (SEAL) and Special Warfare Combatant-craft Crewman (SWCC) ratings. Second, the model should provide extensive policy analysis support, assist in estimating force paygrade distribution (short and long term—up to 20 years out) and in the evaluation of the impact that the force mix (paygrades) will have on operational readiness. Third, the model will provide training pipeline estimates for recruiting goals. Finally, the system will be capable of analyzing the interrelationship between recruiting, Basic Underwater Demolition School (BUDS) production/Basic Crewman Training, and the length of the initial training pipeline on Naval Special Warfare (NSW) personnel inventory levels.

The model is capable of adjusting variables to conduct policy and data change analysis. Some examples include retention rates, attrition rates, promotion selectivity, number of BUDS/Seal Quality Training (SQT) graduates, number of SWCC recruits/basic crewman graduates, length of tours, and EPA changes. Mr. Brose provided sample simulation scenarios for the SEAL Enlisted Model, which began by increasing SQT graduate production to 288 per year in FY07, and allowing the supply-chain inventory adjustment sector

within the model to calculate recruiting requirements. In another example, SWCC Model E8 and E9 EPA Change Scenarios, he discussed two Simulation Runs for comparison—the Current EPA Plan (FY10 E9 EPA-19, FY10 E8 EPA-39), with increased E9 EPA starting in FY10 to 28, and increased E8 EPA starting in FY10 to 65.

Figure 18. Simulation model showing supply-chain inventory adjustments^a

SEAL Community Management Model Development



a. Presented by Mr. Chris Brose (CACI, Inc.) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

The Effects of Shore Billets on FC(A) Retention and Promotion

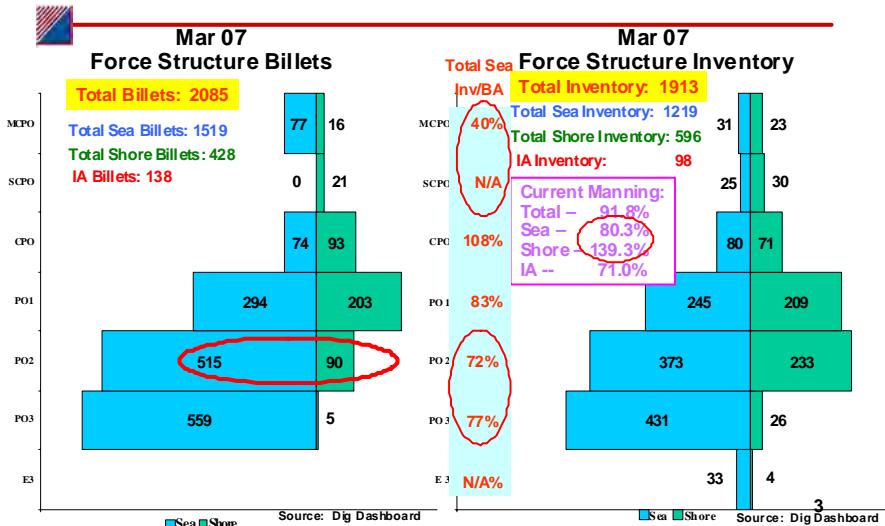
According to Dr. Albert Monroe (CNA), in the past, the Navy aggressively protected sea-shore rotation. This led to severe constraints on reducing shore billets. Over the last few years, the Navy has reduced shore billets without regard to sea-shore rotation, which has had an adverse effect on the Aegis Fire Controlman (FC(A)) community. Dr. Monroe presented the results from a study of these effects.

Dr. Monroe said that FC(A) Sailors are very important because they control the Aegis system, which defends surface ships from missile threats. There are not enough shore billets in the FC(A) community since a shortage of overall shore billets caused a shortage in total FC(A) billets. He said there's a flawed demand signal for FC(A) Sailors, which caused the Navy to recruit and retain fewer FC(A) Sailors. Not enough Sailors leads to shortages at sea, and more shore billets lead to a correct FC(A) demand signal.

Dr. Monroe said that determining which shore billets to add is a combination of two factors: cost and readiness. He said the use of monetary and nonmonetary incentives for sea duty can reduce the number of shore billets that the Navy needs to add. Incentives can be used to lengthen sea tours and to rotate early back to sea. Geographic stability can be used in exchange for shorter shore tours.

Figure 19. FC (Aegis) force structure: paygrade, billets, and inventory^a

FC (Aegis) Paygrade Structure



a. Presented by Dr. Albert Monroe (CNA) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

Dr. Monroe measured the effects of different types of shore billets on the outcomes for retention (retained to 123 months) and promotion (advanced to E-6 by 109 months) using probit regression models. The results showed that the effect of FC(A) shore billets on retention is unclear. The billet types showing highest retention represent less than 25 percent of total billets. Those serving in recruiter, non-FC instructor, and OCONUS billets may have higher retention due to self-selection. Finally, instructor and recruiter billets (but not other in-skill FC(A) billets) may lead to higher promotion rates.

Dr. Monroe recommended a mixed strategy that involves remilitarizing instructor shore billets, when possible, and continuing to aggressively pursue sea duty incentives. Finally, he stated that the Navy should allow willing FC(A) Sailors to serve in recruiter, OCONUS, or non-FC instructor billets.

Determining USMC Wartime Medical Requirements

A CNA study by Dr. Robert A. Levy (CNA) and Dr. James E. Grefer (CNA) examined, analyzed, and recommended the appropriate numbers and types of Navy medical providers, such as physicians, nurses, and hospital corpsmen (HM), to serve in Marine Corps medical units. These providers treat wounded, injured, and sick Marines during major combat operations.

The research objective was to estimate the number and types of medical personnel needed to provide “appropriate” care and minimize the number of casualties who die of wounds. The analysts also examined personnel implications of alternative medical networks focusing on the medical battalion’s Surgical Company versus the Forward Resuscitative Surgical System (FRSS).

The approach was to use a simulation model that assumed a population-at-risk (PAR) based on a notional Marine Corps Regimental Combat Team facing combat casualties drawn from the recent experience in Iraq. The dispersed RCT units and casualty streams were enough to generate stressful workload for individual medical units. The analysts used the Time, Task, Treater file to track medical procedures in a realistic way throughout the medical network. They used a

model that ties the care provided to a specific medical outcome: if high medical workloads caused medical personnel to be not available, resulting in patient waiting times, patients were more likely to die of wounds (DOW).

Figure 20. Battle scenario simulation results^a

Results: Peak Demand, Utilization, and Mortality Rates

Simulation	DOW (%)	Medical officers			Hospital Corpsmen		
		Staff	Peak demand	Avg. use (%)	Staff	Peak demand	Avg. use (%)
Current T/O, OIF	16.0	52	36	28.3	354	91	8.7
Reduced T/O, OIF	16.3	39	35	41.2	146	91	38.6
FRSS, OIF	12.9	34	31	30.0	325	70	6.1

a. Presented by Dr. Robert Levy (CNA) and Dr. James Grefer (CNA) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

Dr. Levy and Dr. Grefer's analysis provides the Marine Corps with a workload and outcome-based methodology, which provides preliminary results that link the demand for medical care on the battlefield to the numbers and capabilities associated with first responders (all HMs), medical officers, and HMs at both the Battalion Aid Stations (BASSs) and the Surgical Company. Their results indicate that this approach of simulating battlefield care is useful in the study of medical personnel requirements of organic Marine Corps units. Based on these results, the analysts believe that there may well be room to reduce the staff of some medical units without a consequent increase in the number of casualties who die of wounds.

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Benefits as Part of Compensation

Marriage and Military: Does the Compensation Subsidy Induce Higher Rates?

Mr. Paul F. Hogan and Ms. Rita Furst Seifert (both of The Lewin Group) gave a presentation on the military's marriage compensation subsidy. Since 1949, compensation has varied by dependency status, largely through the housing allowance and in-kind housing policy. The policy is consistent with a needs-based compensation that might be expected under conscription, but it is not consistent with a competitive compensation system. The percentage differences in total compensation are especially large for junior enlisted, who can obtain about an 8-percent pay raise by getting married. The compensation policy may have an allocative effect in that it may differentially attract those who desire early marriage. Further, it may increase the probability of early marriage for those on active duty.

The study tests the hypothesis that those with military service marry earlier than comparable individuals without military service and also tests the consistency with the incentives provided by the compensation system. The results may have important policy implications because early marriage among active duty personnel affects the cost of the force and may affect readiness. In addition, compensation-induced marriages may result in higher probabilities of divorce.

In addition to drawing from previous literature on this topic, Mr. Hogan and Ms. Seifert extracted data from American Community Survey (ACS) surveys, which sample about 3 million addresses annually in a two-stage sampling design. The analysts ran descriptive statistics of veterans vs. nonveterans, using a logit model. They stated that there could be a bias in which military service selects those who have a taste for early marriage. To test this, they used other measures of military service, including reserve participation, to control for such

preferences. The results show that in the 23- to 25-year-old age range, those who are or who have been on active duty are significantly more likely to marry early than otherwise comparable individuals who had no active duty service, with odds ratios on the order of 3.0. This result is robust with respect to alternative definitions of active service. Those who were “ever married” who have active duty service have higher probabilities of divorce.

In conclusion, Mr. Hogan and Ms. Seifert said that the evidence is consistent with the hypothesis that the active duty compensation system induces early marriage. They said that service in the Reserves controls for correlation through “tastes.” Finally, they stated that the result is inconsistent with an efficient compensation system that rewards performance, and it appears that compensation-induced marriage results in higher divorce probability.

Figure 21. Variables used and results of logit model^a

Results: Model 1

Explanatory Variables	Odd Ratio Estimates	Maximum Likelihood Estimates	Prob
			Wald Chi-Square
Intercept		576.3655	<.001
Sex—Male vs. Female	0.483	1951.0316	<.001
Age—25 vs. 23	2.183	1274.4195	<.001
Age—24 vs. 23	1.470	0.0878	0.7670
Race—Other Non-Hispanic vs. Non-Hispanic White	0.606	26.7245	<.001
Race—Hispanic vs. Non-Hispanic White	1.041	459.2066	<.001
Race—Non-Hispanic Black vs. Non-Hispanic White	0.360	686.6980	<.001
Education—Bachelor degree vs. High school graduate	0.488	1128.8243	<.001
Education—Some College vs. High school graduate	0.839	127.9008	<.001
Served in military—Veteran vs. Non-Veteran	3.113	698.8514	<.001

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a. Presented by Mr. Paul Hogan (The Lewin Group) and Ms. Rita Seifert (The Lewin Group) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

Perceptions and Influence of Quality-of-Life and Retirement Programs

Dr. Diana Lien (CNA) and Mr. Mike Moskowitz (CNA) analyzed various quality-of-life (QoL) programs in support of the 10th Quadrennial Review of Military Compensation. Their research was based on a review of the existing literature, with a focus on more traditional QoL “programs,” such as commissaries. Using data from the DMDC’s December 2006 Status of Forces Survey, the analysts found that those who use the community center, childcare, or commissary are much more likely to stay in the military compared with those who have the programs available and do not use them.

Dr. Lien said, however, that differences do exist between groups. The link between use of the community center and continuation intentions holds for servicemembers regardless of dependent status, serving within the United States, or living on base. The link between the use of commissary and continuation intentions holds for servicemembers without dependent children, serving within the United States or living off base. Dr. Lien said that use of any QoL program represents a type of “engagement” in the military that should be encouraged.

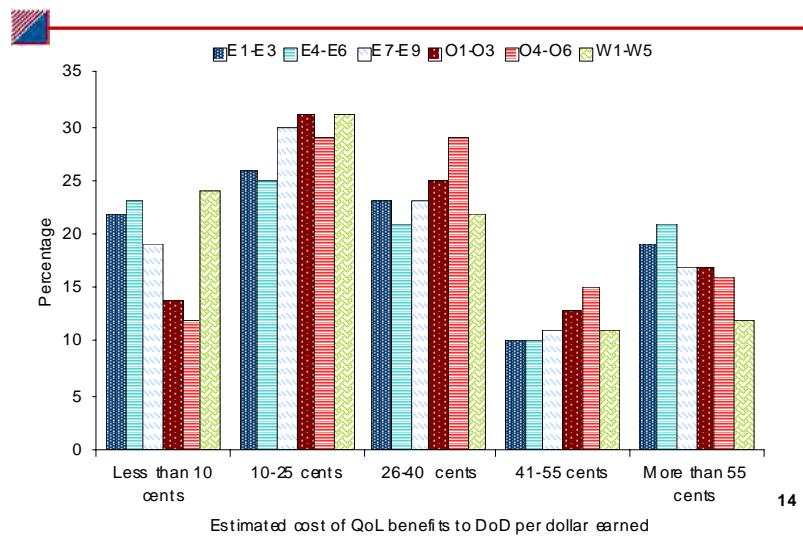
Research indicated that the majority of servicemembers preferred keeping access to specific QoL programs open to family members over switching to a cash voucher system. However, Dr. Lien found that servicemembers undervalue the cost of their benefits, in terms of both how much they perceive their benefits cost the military and how easy they think it would be to find similar income and benefits in the civilian world. In the case of retirement plans, those who were satisfied with the current system more frequently planned to continue serving in the military.

In conclusion, Dr. Lien said that the vast majority indicated that they had access to QoL programs. In fact, only 2.5 percent marked programs as “not available.” She said that access is not consistent since a higher share of servicemembers at bases in the United States have availability to programs. In addition, Dr. Lien found that the use of QoL programs is higher among servicemembers who live closer to the services (on base) and among those with less familiar or fewer

civilian alternatives (servicemembers at non-U.S. bases). Although the use of QoL programs is correlated with likelihood to reenlist, it is difficult to show causality. Finally, even accounting for factors (e.g., length of service) that are typically related to use of QoL programs and continuation, there is still a positive relationship between continuation and the use of the commissary or community center.

Figure 22. Perceptions about the value of military QoL benefits^a

Low valuation of benefits



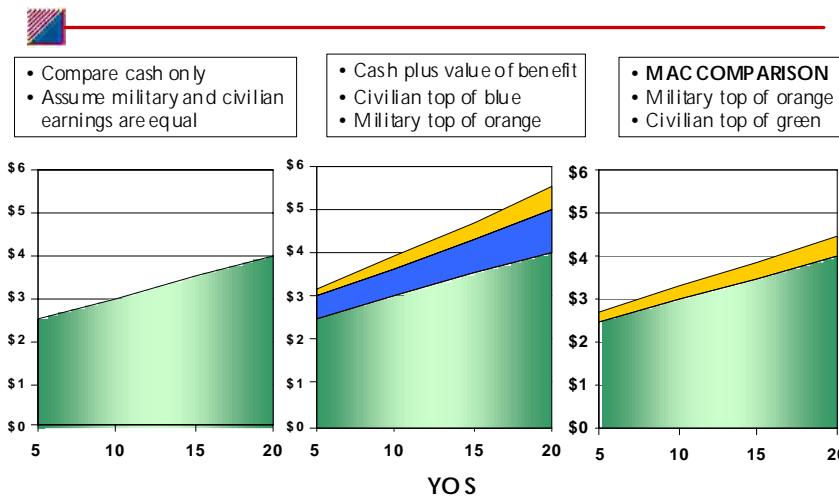
a. Presented by Dr. Diana Lien (CNA) and Mr. Mike Moskowitz (CNA) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

Comparing Military and Civilian Total Compensation

Dr. James Grefer (CNA) began his presentation by stating that a standard method of comparing military and civilian compensation is to focus on the cash portion of the compensation package. Dr. Grefer's analysis makes a more comprehensive comparison of civilian and military compensation.

Figure 23. Comparing military and civilian cash plus compensation benefits^a

Calculating MAC



3

a. Presented by Dr. James Grefer (CNA) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

According to Dr. Grefer, studies have shown that, on average, Regular Military Compensation (RMC) compares favorably with the earned income of the 70th percentile full-time civilians of similar education levels. Looking only at cash, however, ignores differences in the relative value of military and civilian noncash benefits and is akin to assuming that they are equal. This research study shows that military benefits are more valuable using 2006 data to estimate the differences in the relative values of the three important benefits: the State and FICA military tax advantages, the healthcare benefit, and the retirement benefit. The study method involved adding these differences in values to military cash compensation to form a more accurate "benefits equal" comparison of military and civilian compensation packages. The top-line dollar amount estimated by this method is called Military Annual Compensation (MAC) and compares favorably with the 80th percentile earned income for comparable civilians. Dr.

Grefer said that MAC is a more accurate estimate of the value of military compensation when compared with civilian compensation.

Dr. Grefer's analysis found that the annual values of the military benefits are greater by amounts ranging from roughly \$4,100 to \$30,000, depending on rank and length of service. Furthermore, he concluded that other benefits have value, but, if they are not consistent among servicemembers, they are not really part of MAC. In addition, he said that servicemembers are unlikely to correctly value benefits, there's uncertainty about benefit availability in the civilian sector, and rules of thumb tend to underestimate their value. Finally, he believes that future comparisons of military and civilian compensation packages should include noncash benefits.

Pay for Performance and Game Theory

Mr. David A. Breslin, P.E. (NAVSEA) provided a cursory review of various behavioral theories as they apply to employee performance. He believes that several well-known historical perspectives, including the work of Skinner and Maslow, helped to establish the basis for "incentivizing" performance. He placed particular emphasis on the application of 2-Person and N-Person Game Theory in determining how to award bonuses to people in high-performing teams in the most cost effective manner possible. According to Mr. Breslin, the purpose is to give some critical insights into both effective and ineffective incentive systems, and to show how effective incentive systems might be best applied to the acquisition and technology workforce. His strategy involves optimization based on modern game theory.

Mr. Breslin's methodology expands on past works, using macroeconomic and empirical data, such as pay/financial rewards, benefits, educational opportunities, environment, and stability, to better understand human behavior and to develop incentive systems. Mr. Breslin's model takes into consideration individual performance, which includes rational cheaters (responsibility shirkers) and free riders (noncontributors) among employees. He said that one way to get a better understanding of shirkers and free riders, and the best way to reward employees in the context of bonus systems, is through Game Theory. Various Game Theory approaches are used to model

human interactions mathematically, providing insight into expected and observed behavior, and repeated validation through countless experiments.

Figure 24. Application of 2-Person Game Theory Approach^a

2-Person Games

		Player 2	
		Strategy 1	Strategy 2
Player 1	Strategy 1	Player 1 Payout/Player 2 Payout	Player 1 Payout/Player 2 Payout
	Strategy 2	Player 1 Payout/Player 2 Payout	Player 1 Payout/Player 2 Payout

In 2-Person Games, each player typically has two or more strategies, resulting in four or more possible outcomes.

Specific scenarios can address whether each player has perfect or imperfect information (does Player 1 know Player 2's strategy *a priori*), and payouts are determined by established rules.

Games of this nature can be modeled mathematically (utility functions) to identify optimal solutions. Not all games have optimal solutions. Optimal solutions are called *Saddle Points*. If all players have perfect information, the Saddle Point is known as the *Nash Equilibrium*.

10

a. Presented by Mr. David Breslin (NAVSEA) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

According to Mr. Breslin, desired outcomes include systems and processes that are repeatable, achieve desired results, are internally consistent, are compliant with Rawlsian ethics, achieve maximum workforce performance for the minimum payout, have sustainable strategies, and involve greater collaboration among the workforce. In conclusion, he said that zero-sum approaches introduce challenges to implementing effective incentive systems and should, therefore, be avoided. Game-5 approaches (Community Award) could improve on incentive systems that are currently in place. Finally, he said there may be such a thing as the optimum size for an award-pool population.

One-to-One Negotiation of Assignment Incentives for Sailors and Commands

Mr. Kenneth Robinson (Serco) and Mr. John Durgala (Serco) gave a presentation on the Web-Based Marketplace (WBM), a prototype internet application that builds on the concept of the Job Advertising & Selection System to enhance the reassignment process. According to the analysts, in the standard WBM process, Sailors select jobs of interest and bid on those jobs if incentives apply. Commands are then able to select Sailors based on qualifications and the cost of any bid. Mr. Robinson reported, however, that the standard process will not work for all Sailors. To accommodate those individuals, a prototype approach has been developed that allows Sailors to negotiate with commands on a one-to-one basis. He said the one-to-one approach is based on the theory of bilateral negotiations. After Sailors have made the initial bid and commands have made the offer, electronic "agents" conduct the negotiation.

Figure 25. The one-to-one approach based on bilateral negotiations^a

Incentive	Command			Sailor		
	Imp	Offer	Bound	Imp	Bid	Bound
Reporting Date & Related Leave (Days)	2	5 days	10 days	0	0 days	0 days
Incentive Pay (\$)	3	\$100	\$175	4	\$250	\$200
Resident Leader Training (Days)	2	10 days	20 days	5	15 days	10 days
Tuition Assistance (%)	3	50%	75%	5	75%	50%

 Examine:
•Override Level
•Protected Incentives 

a. Presented by Mr. Kenneth Robinson (SERCO) and Mr. John Durgula (SERCO) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

According to the researchers, the prototype approach includes identifying potential incentive areas and measuring to assess the benefit (for the Sailor) and cost (for the command) of the level of each incentive. This is a technique by which Sailors and commands establish the strategy that dictates how bids and offers are adjusted during the negotiation, and rules for reaching a fair agreement or determining that agreement are not feasible. The prototype one-to-one negotiation approach has been implemented within the WBM.

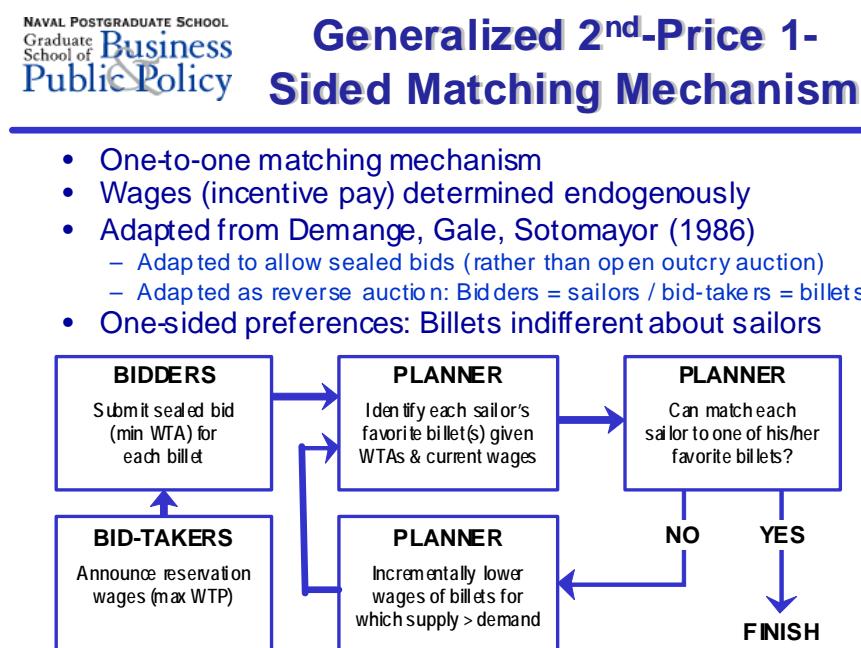
An Alternative Assignment Incentive Pay Auction Mechanism: An Experimental Analysis

Mr. Peter J. Coughlan (NPS), Mr. William R. Gates (NPS), and CDR Nils A. Resare (United States Navy) presented an economic experiment that was developed to test the impact of bidding behavior on two matching mechanisms proposed by prior research for use in the U.S. Navy's Assignment Incentive Pay (AIP) program. AIP is one compensation program that the Navy uses to encourage Sailors to volunteer for less desirable assignments. According to the researchers, unlike other compensation programs, Sailors negotiate AIP rates through an auction-like system. According to Mr. Coughlan, previous research indicates that the Navy's current AIP auction mechanism encourages gaming behavior (strategic bidding), which reduces the cost-effectiveness of that auction design.

The team's research examines two proposed mechanisms to effectively match Sailors to assignments based on the Sailors' bids and Navy valuations: a Sailor optimal mechanism and a billet optimal mechanism. The analysts said that, in theory, the two mechanisms provide different incentives for Sailors to truthfully reveal their minimum acceptable AIP payment through their bids. The research team has developed an economic experiment to help compare the performance of the alternative matching mechanisms, including the incentives Sailors have to bid their true valuations, and to examine how Sailors' bidding behavior affects the matching mechanisms' cost-effectiveness. They reported that the operation of the experimental program was verified through 60 simulated sessions of 10 participants bidding their true values. The program was further tested on a trial

run with 20 volunteer subjects completing 20 bidding rounds each. Mr. Coughlan and his colleagues found the following in the initial observations. The trial run of the experiment suggests that experimental subjects may still attempt to increase their surplus by misrepresenting their minimum acceptable AIP payment, especially under the billet-optimal model.

Figure 26. Sailor optimal mechanism^a



a. Presented by Mr. Peter J. Coughlan (NPS), Mr. William R. Gates (NPS), and CDR Nils A. Resare (United States Navy) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

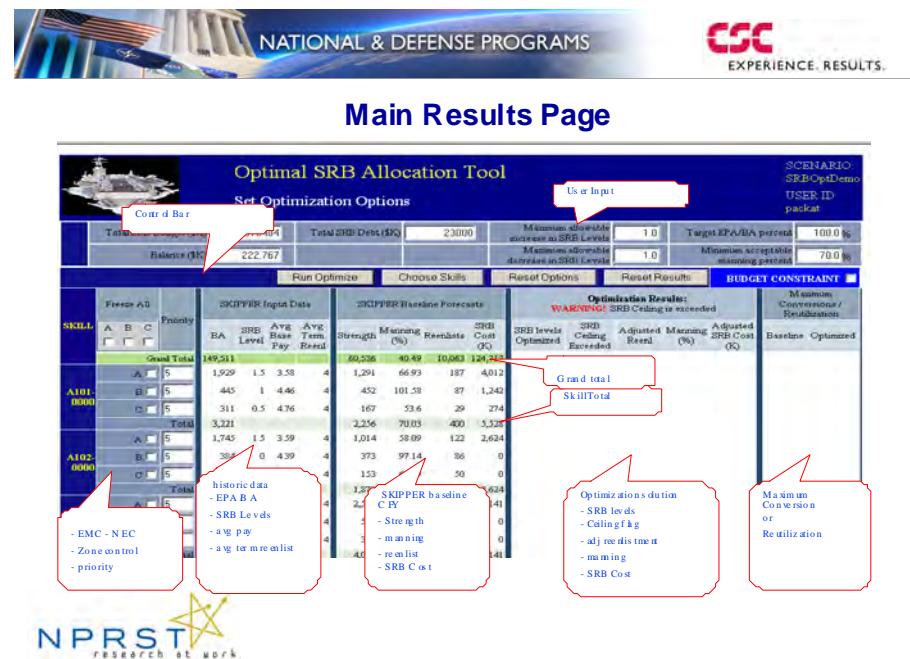
SRB Allocation Model

Mr. Rick Loffredo (CSC), Dr. Chariya Punyanitya (CSC), Dr. Tanja Blackstone (NPRST), and Dr. Colin Osterman (NPRST) gave a presentation on the SRB Allocation Model, challenges, and future steps. According to the research team, Selective Reenlistment Bonus (SRB) management is an important element in a suite of policies employed by Navy managers to better shape the enlisted force. They explained

that SRB affects the reenlistment rates for Sailors in a complex manner with flows being affected between different NEC inventories and strengths.

The research team's objective was to prescribe SRB award levels across skills to achieve projected strength as close as possible to target endstrength by skill and zone. The team described the SRB Allocation Model as a separate web application add-on to SKIPPER. It was developed by CSC for NPRST, and it prescribes SRB award levels to achieve the desired CFY retention by community subject to SRB budgetary constraints. In their approach, they used a constraint satisfaction framework chosen as an alternative to conventional optimization to curb computations. The starting point was the baseline SKIPPER strength projection for end CFY for all relevant EMC-NECs. The computations were subject to SRB dollar resources and maximum allowable changes in SRB levels.

Figure 27. Results produced by NEC selections^a



a. Presented by Mr. Rick Loffredo (CSC), Dr. Chariya Punyanitya (CSC), Dr. Tanja Blackstone (NPRST), Dr. Colin Osterman (NPRST) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

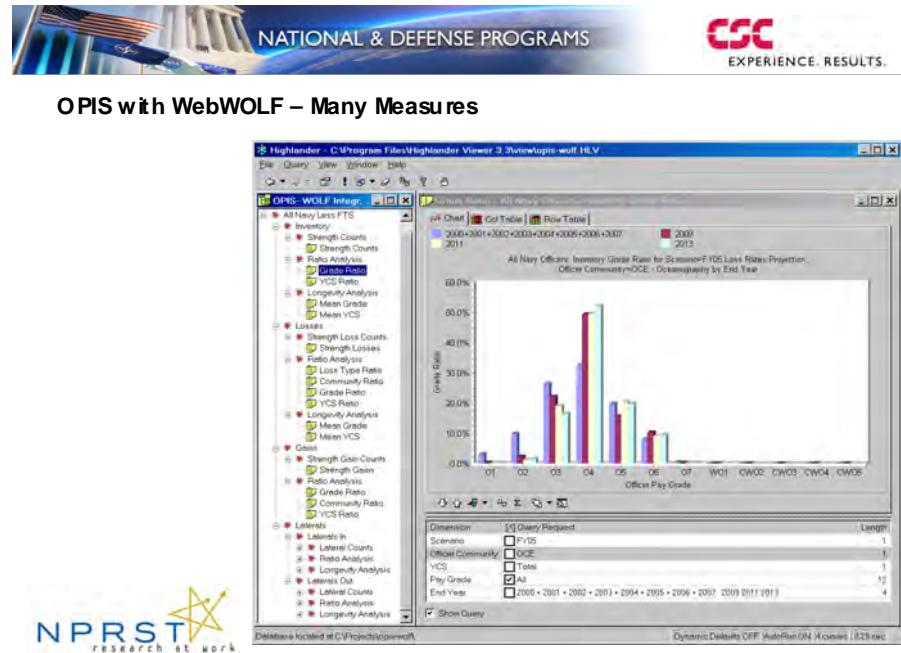
In conclusion, Mr. Loffredo stated that the SRB allocation tool primarily provides quick-response modeling capability to explore alternative SRB allocations to achieve desired manning goals operating through SRB budget-constrained or unconstrained modes. It also allows one to forecast adjusted manning levels, reenlistments, and SRB costs. The tool easily selects combinations of EMCs-NECs to include and can fence off the SRB award levels of certain skills. Second, the tool uses an easy-to-understand Graphical User Interface. Third, it provides an easily extensible modeling framework for future refinements. Finally, the SRB allocation tool can provide an effective means for SRB Decision Support Planning and “what if” drills.

OPIS and WebWOLF—Supporting Officer Community Management Using Historic Data and Future Projections

Dr. Rick Butterworth (Peak Software, Inc.), Mr. Sanjay Nayar (CSC), Ms. Angela Cho (CSC), and Mr. Rodney Myers (NPRST) discussed the integration of OPIS and WebWolf personnel systems. OPIS is a multidimensional summary system for viewing and analyzing officer data based on 33 years of officer personnel data in the Officer History File. OPIS lets users break down the officer force by multiple dimensions simultaneously. Possible dimensions include fiscal year beginning in 1974 through present, designator for which several groupings are available, ethnicity, gender, paygrade, commissioning source, and years of commissioned service. These breakdowns are also available for a number of personnel flows, including losses, gains, promotions, and laterals. The OPIS analysts/users can quickly and intuitively sort through and view just what they want to see. While browsing the force structure, it is easy to drill down total for detail, to individual officer records. Record-level viewing is intended to illuminate the idiosyncrasies of the personnel system and serve as a quality control check.

WebWOLF is a projection system based on overrideable data extracted from the Officer Master File (OMF) that projects accessions, promotions, and inventories at the community level. It can be used to perform various “what if” analyses based on many different possible future scenarios with differing accessions and continuation behaviors.

Figure 28. OPIS and Web Wolf combination provides comprehensive measures^a



a. Presented by Dr. Rick Butterworth (Peak Software, Inc.), Mr. Sanjay Nayar (CSC), Ms. Angela Cho (CSC), and Mr. Rodney Myers (NPRST) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

OPIS and WebWOLF have complementary capabilities that when combined would provide users with the ability to look back over several decades and then use the available data to better inform their assumptions for the future leading to better projections for the future and more forward-looking decision making. OPIS and WebWOLF systems can be integrated so that OPIS can serve as a data source to WebWOLF and then receive projections for different scenarios from the latter, allowing users to see history and future together in one graph or table. The analysts concluded that combining the outputs of a historic data system with a modeling system increases overall utility. Additionally, rich history from OPIS could supply input data to WebWOLF or other officer forecasting tools.

Navy Officer Strategic Model

Ms. Sue Tardif, Mr. Blair Duncan, and Dr. Norm O'Meara (all of LMI) presented findings from a study that developed a single, integrated model to study the overall officer community. The Navy officer corps comprises about 50,000 personnel in 72 distinct career fields, such as submarine, aviation, supply, engineering, and intelligence. The study team hopes to help the Navy to make better decisions about recruiting, promotion, resourcing, and workforce optimization.

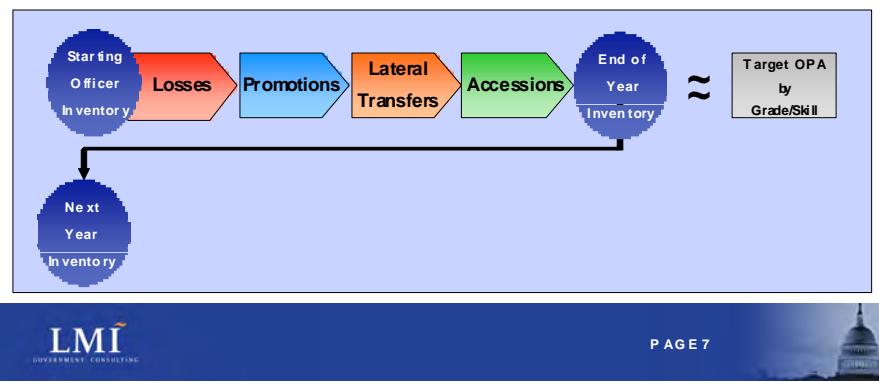
The team's approach to developing a prototype officer planning and forecasting model was to examine all of the requirements and assumptions about recruitment, accessions, transfers, and attrition. The analysts interviewed Navy officials and assessed accession, promotion, and lateral transfer plans as well as historical personnel loss rates. The approach fully integrates the complex workforce dynamics to show how each affects the Navy's future resource and staffing requirements.

The Navy has implemented the model in the prototype state and the analysts are now proceeding with full-scale model development. Mr. Duncan believes that the model provides the Navy with a means to project losses on the basis of historical or econometric factors, promote the workforce to fill required manning levels, laterally transfer the workforce on the basis of force-shaping needs, and determine new officer accessions requirements in addressing force structure strategies.

Figure 29. Model of integrated workforce dynamics^a

Model Functions

In each projection year, the model performs four functions on the starting officer inventory to generate the end-year inventory.



a. Presented by Ms. Sue Tardif (LMI), Mr. Blair Duncan (LMI) and Dr. Norm O'Meara (LMI), at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008

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Diversity

The Navy's Strategic Diversity Effort: An Update

CAPT Ken Barrett, Head of the Navy's Diversity Directorate (N134), began his session with a quote by CNO G. Roughead concerning the the Navy's diversity policy, that "the Navy must empower and inspire all to attain the most senior levels of leadership, foster and support an environment that respects each individual's worth, and anticipate and embrace demographic changes."

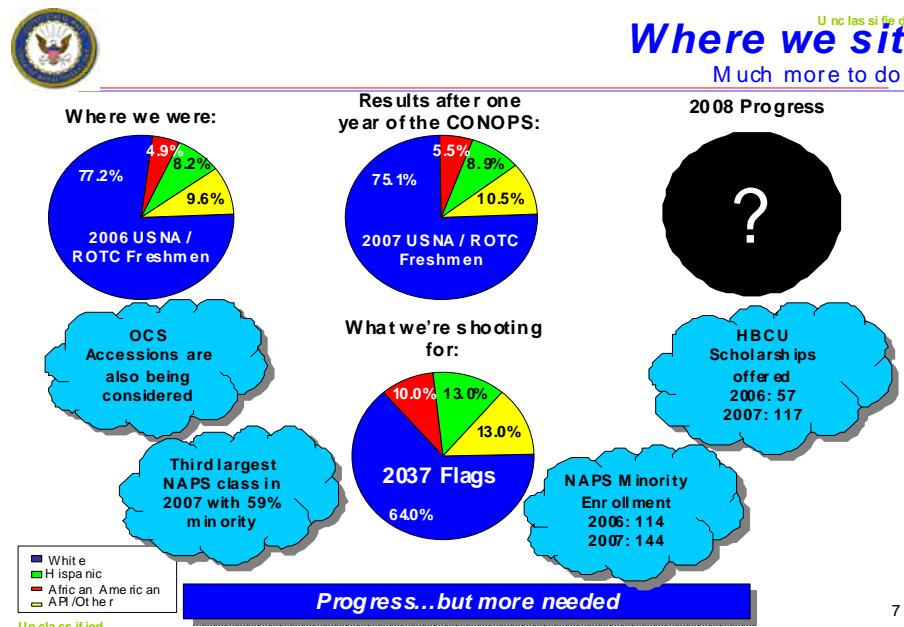
CAPT Barrett explained that an assessment was conducted in phase one of the diversity strategy. First, a Navy-wide snapshot was taken of diversity strengths/weaknesses. The focus was on recruiting, retention, and promotion. Next, improvement areas were identified in leadership accountability, mentoring, training, outreach, and communications. In phase two, feedback from working groups and teleconferences indicated that there was no leadership accountability, inadequate outreach, unproductive mentoring, disjointed training, and ineffective communications.

In the next part of the strategy, a target officer benchmark for accessions was established. After 1 year of CONOPS, there was progress, but more is needed. The new focus area for 2008 is diversity accessions. The goal is to establish the Navy as the employer of choice. Strategies include developing a mentoring culture and saturating the market by moving from fishing to trawling but pooling recruitment resources. The strategy is synchronized by bringing together strategic players, operational players, tactical players.

According to CAPT Barrett, a mentoring continuum built from the chain of command, enterprise community, affinity groups, one-to-one, and peer-to-peer involves a leadership strategy that will affect the career health of every soldier. Finally, the Task Force Life Work (TFLW) Mission & Vision is to examine initiatives that the Navy can

influence through policy change, identify efforts that require DoD/congressional engagement, and solicit fleet feedback for ideas and recommendations.

Figure 30. Preliminary results of the Navy's diversity strategy^a



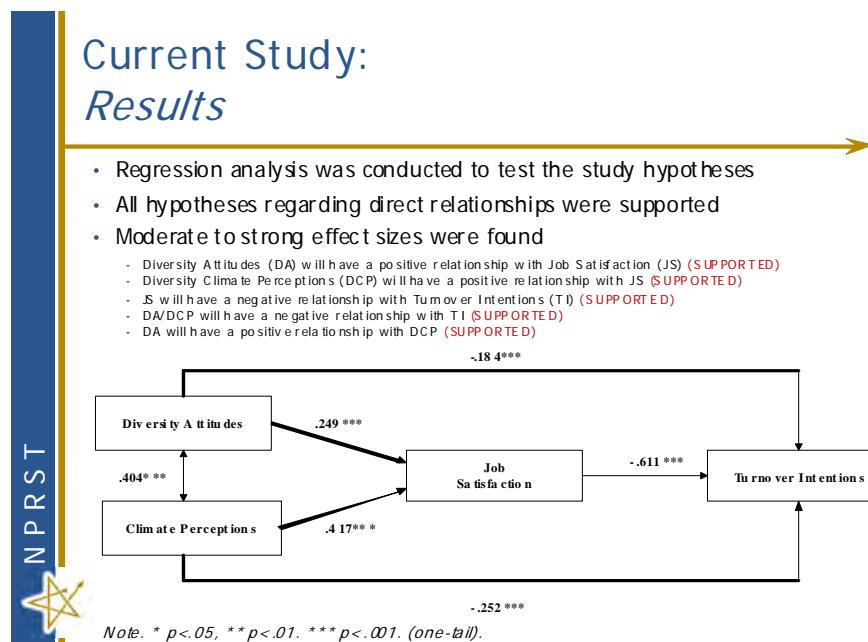
a. Presented by Captain Ken Barrett (N134) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

Diversity Attitudes and Organizational Outcomes: Are There Group Differences?

Diversity researchers have theorized that diversity affects organizational outcomes, such as retention and job satisfaction, but few empirical studies have investigated this claim. The goal of the present study was to examine the importance of two diversity constructs, diversity attitude and diversity climate perceptions, on the key indicators of job satisfaction and turnover intentions. This study also investigated whether the demographic variables of officer/enlisted status, gender,

and race are covariates of diversity attitudes, diversity climate perceptions, job satisfaction, and turnover intentions.

Figure 31. Results for psychometric evaluation of relationships^a



a. Presented by Ms. Yueh-Chun (Anita) Kang (University of Memphis) and Ms. Carol E. Newell (NPRST) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

Researchers Ms. Yueh-Chun (Anita) Kang (University of Memphis) and Ms. Carol E. Newell (NPRST) discussed the two diversity constructs. *Diversity attitude* refers to the extent to which an individual supports diversity concepts and values differences between organizational members on primary and secondary traits. *Diversity climate* refers to a person's assessment of the organization's support for diversity, through its organizational policies, culture, norms, and so on.

The researchers investigated the following hypotheses: (1) Diversity Attitudes (DA) will have a positive relationship with Job Satisfaction (JS); (2) Diversity Climate Perceptions (DCP) will have a positive relationship with JS; (3) JS will have a negative relationship with Turnover

Intentions (TI); (4) DA/DCP will have a negative relationship with TI; (5) DA will have a positive relationship with DCP; and (6) JS will mediate the relationship between DA/DCP and turnover intentions. Regression analysis was conducted to test these study hypotheses. The results indicated that all hypotheses regarding direct relationships were supported, and moderate to strong effect sizes were found.

Ms. Kang and Ms. Newell also evaluated whether the results would vary for different demographic groups. As an initial test, a Multivariate Analysis of Variance (MANOVA) was conducted to assess the impact of group differences. Group differences were found for Officer/Enlisted status, gender, and racial groups on the four primary variables. Interactions were found between Officer/Enlisted status and gender, and between Officer/Enlisted status and race. These results indicate that the model may vary by demographic groups. Demographic groups differences were further investigated with regression analysis, which found small differences. Overall, the demographic variables had little impact on the model structure.

Ms. Kang and Ms. Newell concluded the following: this study provides empirical support that diversity attitudes and diversity climate perceptions affect the key organizational outcomes of job satisfaction and retention. Follow-on analyses revealed that demographic group membership had little impact on the model structure. Assessing diversity-related attitudes is beneficial to the Navy in that the continuous assessment provides benchmarks that can be used to assess the effectiveness of the Navy's diversity program; based on the study results, improving Sailor diversity attitudes and diversity climate perceptions may be financially beneficial by reducing attrition.

CNA Research on Diversity and Demographic Representation in the Armed Services

Dr. Ann Parcell presented a summary of several recent CNA studies on demographic representation and diversity in the armed services. Dr. Parcell began the presentation by explicitly distinguishing between the concepts of diversity and representation and defining each. Then, she described examples of CNA work in both areas.

Representation captures the extent to which an organization's demographic profiles (usually gender and/or racial/ethnic profiles) match those of the U.S. population or some other relevant benchmark. Its importance to the military is derived from the philosophical foundations of a democratic society. In particular, a long-standing body of literature argues that a broadly representative military force is more likely to uphold national values and to be loyal to the government and country that raised it. In addition, representation among military members equalizes both the risk of injury and death in wartime and access to the opportunities for education, training, and leadership that are the benefits of service. Given these arguments, demographic representation focuses on outcomes for both the individual and society.

Diversity captures the range of personal characteristics that define social identity in the work place. Its importance is based on the role of social identity in group dynamics and the importance of group dynamics for group performance. Theories predict, and empirical work finds, both positive and negative effects associated with work-group diversity, including improved problem-solving capability and increased creativity, increased conflict, and less and lower-quality communication. As described, diversity focuses on the work group or organization.

The representation-diversity distinction matters because the two ideas are aimed at achieving different policy goals—a specific workforce demographic profile vs. specific performance outcomes—which would be achieved using different strategies and would be tracked using different metrics. Thus, using "demographic representation" and "workforce diversity" interchangeably is likely to confuse the policy message. In particular, representation efforts may be diluted if they are erroneously tied to performance.

Following this general discussion, Dr. Parcell described CNA work on diversity conducted for the Air Force and CNA work on demographic representation done for the Navy.

In diversity work for the Air Force, CNA analysts have done a series of qualitative studies. The research was done in three phases, each directed at a different fundamental question:

1. What is diversity and what amount of it optimizes capability?
2. What is the relationship between diversity and capability in the USAF?
3. How can USAF leaders use diversity to optimize capability?

CNA work on representation in the Navy supported the Navy Diversity Directorate (N134) in the following action items. We drafted quarterly situation reports (SITREPs) for N1 in response to a CNO request. In the first SITREP (Nov 2006), we compared/contrasted USNA and NROTC scholarship selection processes with regard to race/ethnicity. For the second (Feb 2007), we described a 2012 officer accession plan to achieve 2037 race/ethnicity URL flag pool goals that had been set by N134. In the third (June 2007), we compared the pools of applicants for USNA and the NROTC scholarship program and examined the overlap of applicants to both programs.

Figure 32. Accessions needed to address the case for force diversity^a

Representation in the USN

Accessions needed for the 2037 flag pool representation goal

URL officer accessions from USNA, NROTC (scholarship), and OCS*				
Racial/ethnic group	2037 representation goal (percentage of total)	2002-2006 accessions average (percentage of total)	2002-2006 accessions average (levels)	Change in the number of accessions needed**
African American	11%	5%	111	+ 106
Hispanic	13%	6%	125	+ 151
API/NATAM	13%	4%	76	+ 190
White	63%	82%	1,682	-397
Other/unknown	0%	2%	49	-49
Total	100%	100%	2,043	0

* Excludes enlisted-to-officer programs.

**Assumes no change in the total number of accessions.

15

- a. Presented by Dr. Amanda Kraus (CNA) and Dr. Ann Parcell (CNA) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

Why Do Male and Female Surface Warfare Officers Leave the Navy? An Analysis of the Individual Ready Reserve

Ms. Alice Crawford (NPS) discussed a 2006 study for N1 that focused on retention of women SWOs. Women who stay SWOs are motivated by the same reasons as men; they have had mentors, and family concerns remain among many women. The study described QOL, leadership, monetary, and career path issues. Other studies question SWO bonus and leadership/culture. The research in 2007 analyzed SWO IRR survey data. The study sought to answer the following questions:

- Can we learn anything new from those who are no longer on active duty?
- Do reasons for leaving differ by gender?

The first 4 of 28 factors for *both* men and women were strain on family, overall time away from home, life/work imbalance, and ability to start/grow a family. The top third are family and leadership factors.

In some final comments on the survey, Ms. Crawford said that, of the concerns related to SWO leadership, culture and morale outweighed other categories—for men (43 percent) and for women (29 percent). Family/personal time issues were also commented on frequently—men (10 percent) and women (24 percent).

In conclusion, Ms. Crawford listed the influences to leave in priority order: family, leadership, compensation, and benefits. She said that few differences exist between male and female data. Both men and women would consider a return to active duty if changes were made (more women than men). Finally, Ms. Crawford said that nonmonetary retention factors should be addressed.

Figure 33. Male vs. female ratings of separation factors^a



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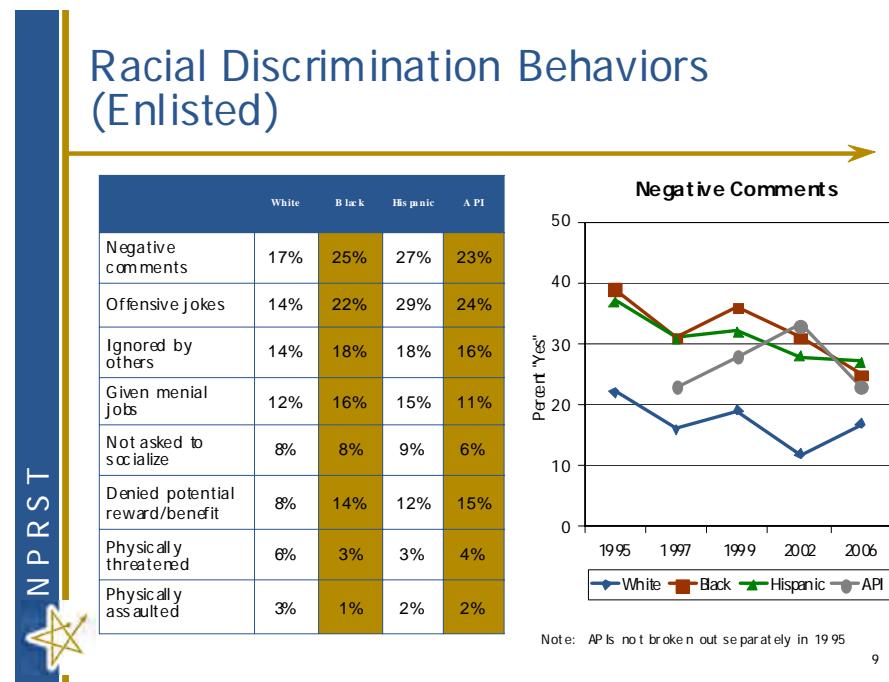
Selected Ratings of Separation Influences ("Very Strong" or "Strong") for YG 94 & Later		
	Men	Women
Lack of SWO Role Model	13	12
Lack of SWO Mentor	14	13
Total Military Pay	14	19
Promotion Opportunities	16	21
SWOCP Amount	20	21
Sexual Discrimination	23	15

a. Presented by Ms. Alice Crawford (NPS) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

Assessing Diversity, Discrimination, and Sexual Harassment in the Navy: Results of the Navy Climate Survey

Dr. Paul Rosenfeld (NPRST) and Ms. Carol E. Newell (NPRST) presented the results from a Navy Climate Survey on diversity, administered between August and November of 2006. The diversity issues covered in the survey included Awareness & Support, Leadership, and Organizational Impact. Other surveys examined whether diversity allows the Navy to better accomplish its mission (officers) and overall satisfaction with diversity in the military. The study also looked at the percentage who experienced racial/ethnic discrimination during the past 12 months among enlisted and officer ranks. The survey provided a climate survey of sexual harassment by gender difference and enlisted vs. officer. A report was given of the percentage who experienced sexual harassment and discrimination during the past 12 months.

Figure 34. Trends in racial discrimination experiences^a



a. Presented by Dr. Paul Rosenfeld (NPRST) and Ms. Carole Newell (NPRST) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

Dr. Rosenfeld summarized the results for diversity. The good news was that awareness and support for the Navy's diversity efforts have increased. He mentioned several areas of concern, however. First, whites are less likely than minority members to feel positive about the Navy's diversity efforts, and they express less commitment to leading diversity than minority members do. Second, minorities and women are generally less likely than whites and men to agree that Navy senior leadership supports diversity.

Dr. Rosenfeld also summarized the results for mentoring. The good news is that nearly 60 percent of officers (70 percent black officers) indicate that they currently have a mentor (was 53 percent in 2004). Despite gains, one-third of enlisted and about 40 percent of officers do not currently have a mentor. The results and good news about training are that more than three-fourths received EO training, and higher percentages (84 to 91 percent) received fraternization, sexual

harassment, and sexual assault prevention/awareness training in the past year. Despite improvements, however, 100 percent compliance with mandatory trainings has not been achieved.

The racial/ethnic discrimination results indicated that, for blacks (both officers and enlisted), rates of discrimination have decreased since 1995, though rates were the same as or similar to those of 2002. Despite reductions over time, about one-third of enlisted minorities and one-fourth of black officers indicate that they have experienced racial/ethnic discrimination in the past 12 months. The sexual harassment results are good news: in 2006, fewer women reported being harassed than in 2002. Harassment rates for women (both officers and enlisted) have decreased by about one-third since 1995. The concern is that one-third of women officers and over half of enlisted women believe that sexual harassment is a problem in the Navy.

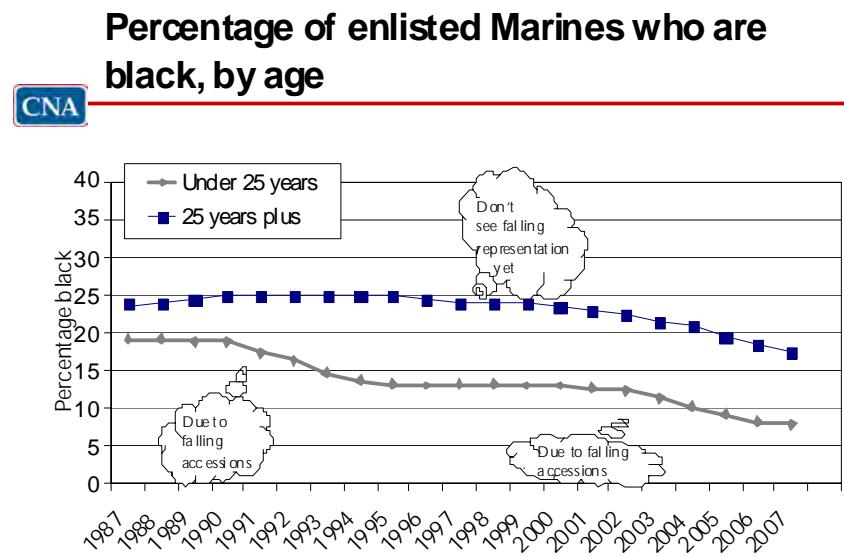
Black and Hispanic Marines: Their Accession, Representation, and Success in the Corps

Ms. Anita Hattiangadi (CNA) and Dr. Aline Quester (CNA) discussed diversity issues in the USMC. The Marine Corps wants its ranks to reflect the “face of America,” and CNA has conducted several studies to assess the accession, representation, and success of various groups in the Marine Corps. According to the analysts, success in the Marine Corps is generally measured by a lack of attrition.

Ms. Hattiangadi stated that there has been a decline in the number of black Marine recruits as a percentage of all non-prior-service Marine recruits between FY 1979 and FY 2007. She said that the decline of Marine accessions for those under 25 began about 8 years before the decline for those 25 and older. Ms. Hattiangadi and Dr. Quester also reported that there has been a greater decline in black parental support of decisions for their children to join the military.

Statistics show that the percentage of non-Hispanic black enlisted Marines in March 2007 increased from private to sergeant major/major gunnery sergeant. This snapshot shows the same for the Army, but the Army has larger numbers among the ranks.

Figure 35. Declining black Marine recruits^a



Source: CNA tabulations of data from March Headquarters Master File (HMF) files.

a. Presented by Ms. Anita Hattiangadi (CNA) and Dr. Aline Quester (CNA) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

The analysts reported that Hispanic Marine recruits as a percentage of all non-prior-service Marine recruits have increased in numbers between 2002 and 2007 after a steady level of representation since 2000. The percentage of enlisted Marines who are Hispanic has increased steadily from 1987 to 2007. The greatest percentages of Hispanic Marines by grade as of June 2007 shows a gradual increase up through corporal and sergeant and then begins to decline with the lowest numbers in sergeant major/major gunnery sergeant ranks.

First-term reenlistment rates by racial/ethnic group for FY80 through FY06 indicated that black reenlistments were highest. The current rate of reenlistment for both black and Hispanic sergeant major/major gunnery sergeant ranks is higher than the original accession rate.

Black officer candidate accessions have been declining and Hispanic officer candidates rising as a percentage of all Marine officer accessions. Educational attainment affects a smaller proportion of black accession shares as compared to Asians and whites.

The percentage of Marine officers who are Hispanic has increased from FY 1987 to the same level as black officers in FY 2007. The percentage of black Marine officers continues to be greater than that of Hispanic Marine officers by grade as of June 2007. Black officers hold a larger share of accessions than Hispanic officers according to biennial data from FY 1974 through 1992. The same is true for shares of field grade and general officers in 2007.

In conclusion, Ms. Hattiangadi said that, although black accessions are down, black Marines do well in the Corps. Hispanic enlisted accessions are still strong; however, officer accessions are slightly below representative levels. She stated that Hispanic Marines also do well in the Corps. The analysts stated in closing that success stories need to be publicized to help counter negative influencer/media perceptions.

Quality of Life

U.S. Army Morale, Welfare, and Recreation (MWR) Program Links to Readiness: The Army Spouse Perspective

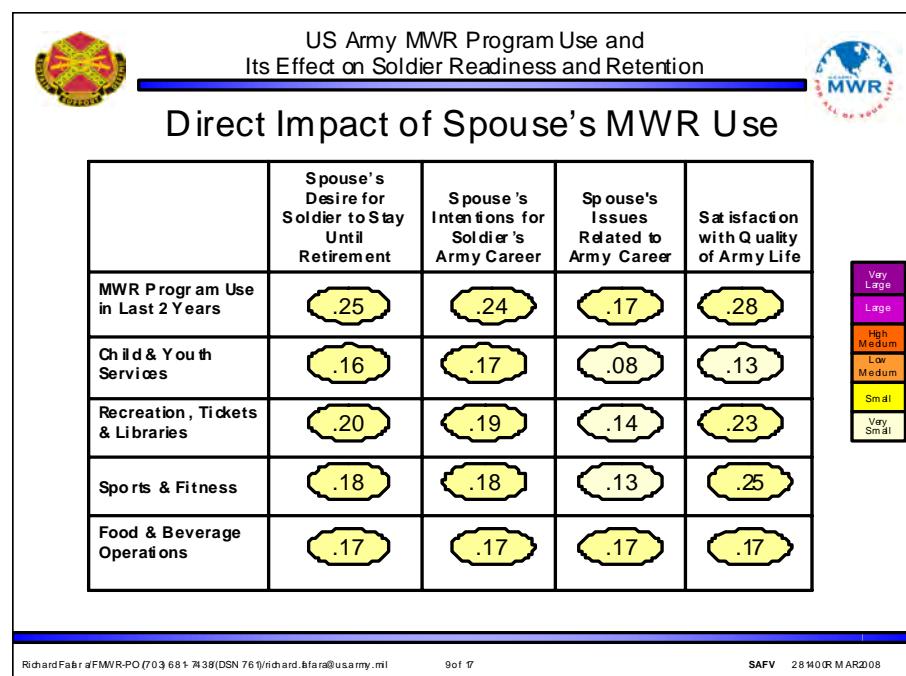
Dave Westhuis, Ph.D. (Indiana University), Joanne Marshall-Mies and Amy Turner (Swan Research, Inc.), and Richard Fafara, Ph.D., and Carleton Sea (Family and Morale, Welfare and Recreation Command (FMWRC), U.S. Army) gave a presentation on the links between MWR and readiness. According to the analysts, past research by Caliber Associates (1995, 2003) specified a conceptual model of MWR use and identified possible links (direct and indirect) between MWR use and readiness dimensions. Dr. Westhuis and Dr. Fafara (2007) tested the Caliber model by conducting an in-depth analysis of the use of MWR programs using spring 2005 Sample Survey of Military Personnel (SSMP) data.

One objective of the study was to validate a recent analysis of the relationship of MWR use to retention and readiness using spouses' responses to the 2004/5 Survey of Army Families V (SAF V). Another object was to determine if statistical significance exists between a spouse's MWR use and a spouse's (a) desire for soldier to stay in the Army until retirement, (b) intentions for soldier's Army career, (c) issues related to soldier's Army career, and (d) satisfaction with quality of Army life. The final objective was to measure the strength (effect size) of any of the relationships of spouse use of MWR programs and groups of MWR programs to the outcome variables.

The research showed a direct impact of spouse's use of MWR programs on key Army variables. The largest direct effect of spouse's use of MWR programs is on the spouse's satisfaction with the quality of Army life. All relationships are statistically significant. Effect sizes (ES) are educationally significant. In conclusion, Dr. Westhuis said that this analysis of spouse's responses to SAF V replicated the recent

analysis of the relationship of soldier's MWR use to soldier's retention and readiness based on responses to the Spring 2005 SSMP. This suggests that these findings are valid and reliable.

Figure 36. Strength effect size of Morale, Welfare and Recreation on key readiness variables^a



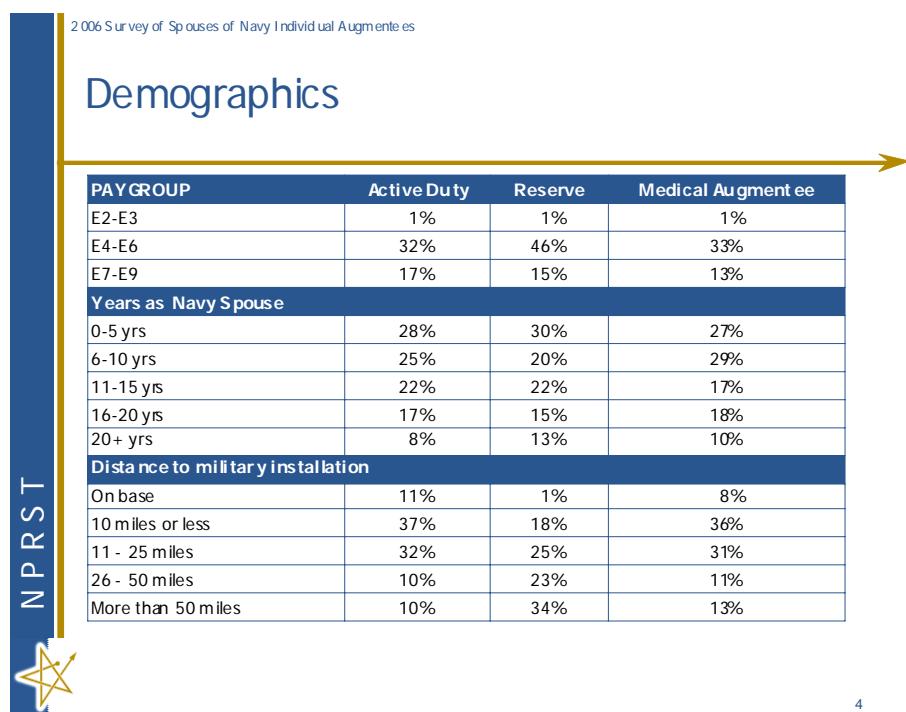
a. Presented by Dave Westhuis, Ph.D. (Indiana University), Ms. Joanne Marshall-Mies and Ms. Amy Turner (Swan Research, Inc.), and Richard Fafara, Ph.D., and Mr. Carleton Sea (Family and Morale, Welfare and Recreation Command, U.S. Army) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

Dr. Westhuis and his team said that small, direct effect sizes were found for use of MWR programs and groups of MWR programs on the four outcome variables, including the spouse's desire for the soldier to stay in the Army until retirement and the spouse's satisfaction with the quality of Army life. Very small direct effect sizes were found for the use of ACS programs on the outcome variables. Finally, results show that the increased use of groups of MWR programs strengthens the effect size on all of the outcome variables.

2006 Survey for Spouses of Navy Individual Augmentees (IAs)

Dr. Rosemary Schultz (NPRST) presented the results of a survey of spouses of Navy IAs. The survey was provided, in either paper or online form, to a list of married Active Component (AC) and Reserve Component (RC) Navy officers and enlisted, either currently serving IA duty in CENTCOM AOR or having recently returned from IA duty. PERS-46 provided the list. Medical augmentees were added at request of VADM Arthur.

Figure 37. Demographics of the 2006 Survey of Spouses^a



a. Presented by Dr. Rosemary Schultz (NPRST) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

The surveys were administered between October 9, 2006, and March 2, 2007. The sample size was 5,533, and 1,845 surveys were returned, for a response rate of 37 percent. Dr. Schultz shared the following survey findings. Most spouses (75 percent or more) were able to communicate with the servicemember at least once a week. The top

three aspects of IA duty that spouses were most satisfied with were: information on location of servicemember, time to readjust after return, and personal/family time before leaving. Spouses were least satisfied with premobilization/deployment briefing for family, Family Readiness Group/Family Support Group (FRG/FSG), and where to get help and more information.

Dr. Schultz reported that the most satisfying family support services were the commissary, the exchange, and medical care. Least satisfying were childcare availability and affordability, and programs for youth/children. The top challenges spouses faced due to IA duty were stress/worry/depression, children's coping, and single parenting. Spouses believe the best solutions would be greater command involvement, more information and communication on services provided, support groups and/or ombudsman for IA families, and more notice to allow families to prepare for IA duty. Few differences were found between AC, RC, and Medical. RC spouses reported lower overall quality of support from the Navy after IA duty than before or during IA duty.

Task Force Life/Work

LT Stephanie Miller and LT Hope Brill (Women's Policy, NPRST) discussed why there is now more focus on Work/Life Balance. LT Miller said it's because we are in a competitive "battle" for talent. The Navy has to compete to both recruit and retain talent. According to LT Miller, 70 percent of all new workers in 2008 will be minorities or women. She reported that for every two Baby Boomers leaving the workforce, there is only one Generation X or Millennial to take their place. LT Miller said that corporate America is more free to offer flexible career options catering to personal/family priorities. She contends that retaining Millennials and women is critical to manpower stability and success.

LT Miller said that women will earn the majority of higher degrees in the United States. They represent 58 percent of all college graduates and 45 percent of graduate degrees. The number of women with graduate and professional degrees is expected to grow by 16 percent, compared with 1.3 percent for men.

LT Miller presented five drivers that most significantly affect Work/Force Commitment: (1) understanding the direction of the organization, (2) personal growth opportunities, (3) satisfaction from everyday work, (4) the extent to which the organization encourages individuals to challenge the way things are done, and (5) work/life balance.

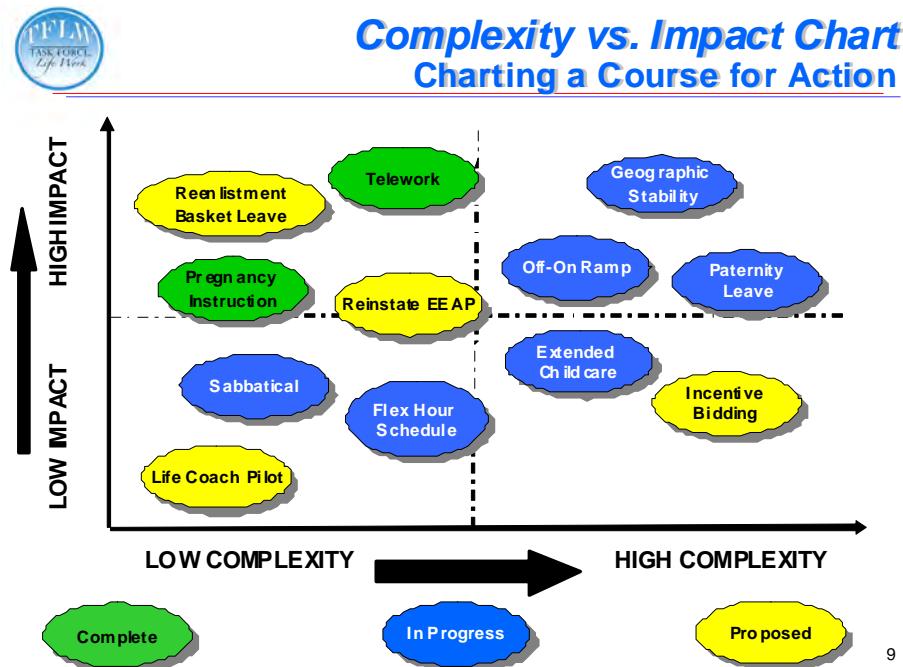
The mission and vision of Total Force Life Works (TFLW) is to examine initiatives the Navy can influence through policy change. It also involves identifying efforts that require DoD/congressional engagement and soliciting fleet feedback for ideas and recommendations.

In August the TFLW team traveled to major Fleet Concentration Areas with the TFLW Roadshow, which consisted of a video message from VADM J. C. Harvey, Jr., Chief of Naval Personnel, a brief outlining the mission and vision of TFLW, and an overview of TFLW's ongoing and in-progress efforts. The last portion of the roadshow consisted of a feedback/commentary session in which Sailors could voice ideas and opinions. Certain themes resonated in different geographic locations, as indicated above.

The team used a chart of complexity vs. impact for examining ideas and initiatives. For example, low-impact, low-complexity initiatives include such things as flex hours and sabbaticals. High-impact, high-complexity initiatives include such things as geographic stability and paternity leave. The authors said that the Navy's leadership seeks to walk the fine line of holding true to core beliefs about what makes our Navy "our Navy" while challenging the way they do business to stay relevant to the current pool of talent they are bringing on board.

In concluding remarks, LT Miller said that TFLW is not looking to change 237 years of Navy history and tradition. Instead, TFLW is looking to build on the best of the Navy's traditions while making changes to policy, law, and leadership from the perspective of generational diversity and life/work balance to influence an overall culture change that improves quality of life for servicemembers and their families. Finally, LT Miller said that the key to successful culture change is flexible options, out-the-door rapport, removing the stigma of life/work balance choices, and overall creation of a mentoring culture.

Figure 38. Examining ideas and initiatives for life/work balance^a



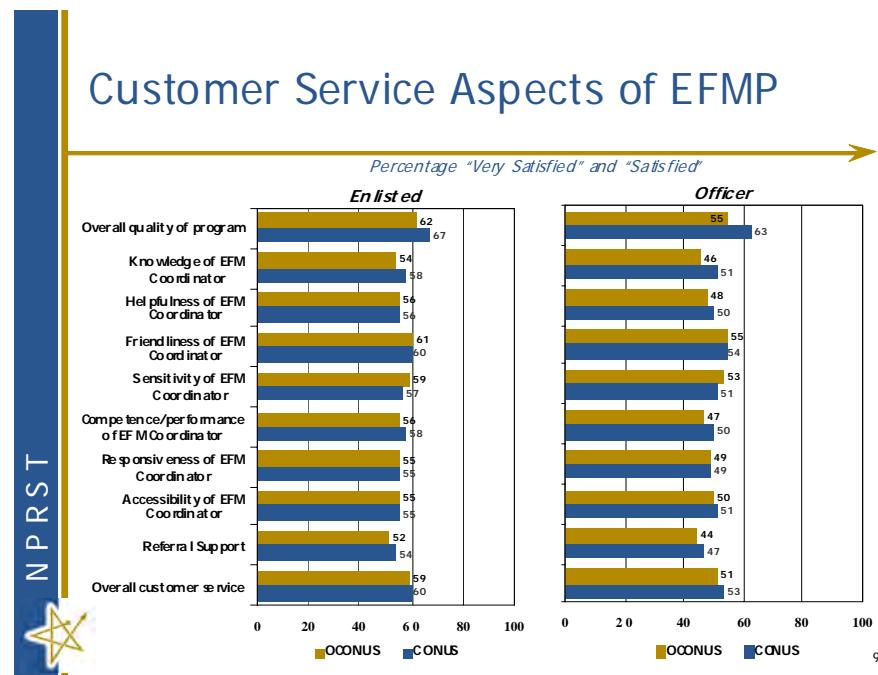
a. Presented by LT Stephanie Miller and LT Hope Brill (NPRST) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

Results of Exceptional Family Member Program Quick Poll

Dr. Kimberly Whittam and Dr. Paul Rosenfeld (NPRST) discussed N135's interest in better understanding the perceptions and opinions of participants in the Exceptional Family Member Program (EFMP). NPRST conducted the first-ever scientific Navy-wide Quick Poll of the EFMP, with the results statistically representing program participants. The focus was to understand satisfaction with EFMP and the impact of EFMP on career and Navy work life.

The poll dates ran from May 31 to June 1, 2007. The sample size was 4,362, with 1,285 returns and a response rate of 30 percent. The demographics included enlisted and officer ranks, all marital status categories, and CONUS/OCONUS. Customer service components of EFMP were similarly rated among enlisted members and officers in all geographical areas.

Figure 39. EFMP customer service components^a



a. Presented by Dr. Kimberly Whittam and Dr. Paul Rosenfeld (NPRST) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

According to Dr. Whittam and Dr. Rosenfeld, the general poll findings indicate that CONUS members are more satisfied than OCONUS members with EFMP, and enlisted are more satisfied than officers. Demographically speaking, the majority of respondents have been EFMP participants for 5 years or less. The predominant source of information is the MTF. About half are satisfied with EFMP customer service; however, it is a concern that the overall satisfaction is less than that found for other QOL/MWR programs. One-quarter or less thinks that participation in EFMP negatively affects career, and enlisted are more likely to see participation as negative. The majority (one-half to two-thirds) of respondents believe that they receive equal consideration for promotion.

A slight majority of respondents believe that EFMP makes a positive contribution to a family's quality of life, and most believe that the services offered are matched well to their needs. Almost half of CONUS

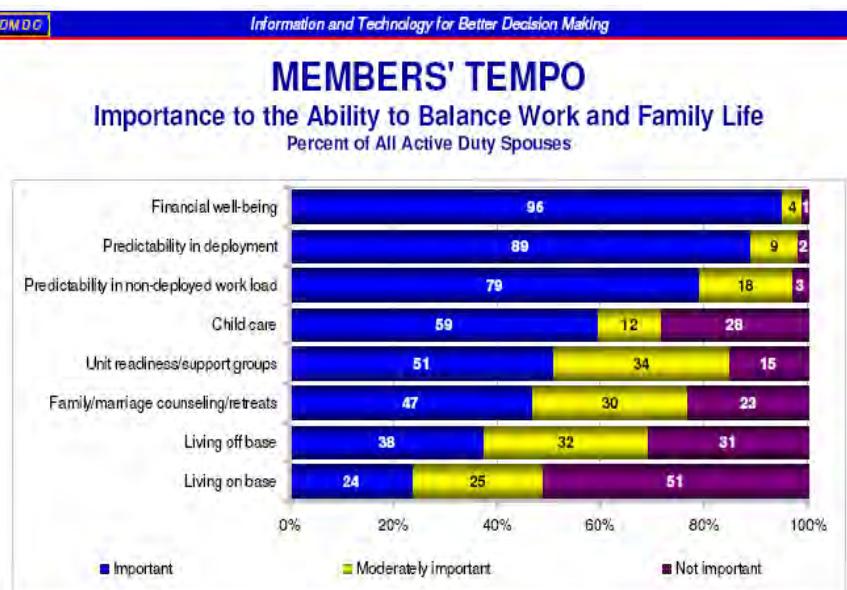
participants report that the EFMP increases desire to remain in the Navy. Only one-quarter to one-third of OCONUS participants report the same. Overall, the majority is satisfied with EFMP, with one-quarter or fewer reporting being "Dissatisfied" or "Strongly Dissatisfied."

2006 Active Duty Spouses: Member and Family Readiness and Support

Dr. Rachel Lipari (DMDC), Ms. Kelly Sand (DMDC), and Mr. Jason Smith, (DMDC) presented the results of a 2006 active duty spouse survey. The analysts found that the top three issues for work/life balance are predictability in nondeployed workload, predictability in deployment, and financial well-being. The demographic representation of the survey was widespread. Most members and family live in and prefer civilian housing. Dr. Lipari reported that there is overall satisfaction with member spouse's ability to balance work priorities with personal life. She said during the most recent member deployments that the top three issues were feelings of anxiety or depression, difficulty sleeping, and loneliness. The most important factors in coping with deployment include deployment pay, predeployment information, having no changes in the length of deployment, knowing the expected length of the deployment, and ability to communicate with a spouse. The three most frequently mentioned behavioral changes after deployment were appreciate family and friends more, appreciate life more, and get angry faster.

According to the research results, the top three emotions that children experienced as a result of member deployments were (1) fear/anxiety, (2) closeness to family members, and (3) problem behaviors at home. The most important factors for children's ability to cope with member deployments include ability to maintain a stable household routine, communication with the deployed parent, and geographic stability during deployment. Approximately 64 percent indicated that their children had coped well with the spouse's deployment. Overall, most active duty spouses are satisfied with military life and plan to stay until retirement. In addition, 86 percent of spouses said they were very happy or happy in their marriage relationship.

Figure 40. Active duty spouses rate importance of work/family life balance^a



a. Presented by Dr. Rachel Lipari (DMDC), Ms. Kelly Sand (DMDC), and Mr. Jason Smith, (DMDC) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

Dr. Lipari said that, in terms of financial well-being, families are mostly able to make ends meet without much difficulty. Most are not familiar with the Military Spouse Career Center Website. Finally, the top three preferred programs and services are commissary/grocery store, legal assistance, and the exchange/department store. Information about programs and services is mostly given by word of mouth.

Finally, research results indicate that, within the past 12 months, 92 percent of spouses and their children/dependents received health care at a military MTF or received health care that was paid/coordinated through TRICARE. Most were satisfied with the health care services that were provided. In fact, more than 72 percent of respondents expressed overall satisfaction with military health care benefits, and 55 percent were satisfied with dental benefits.

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Enlisted Accession Supply Chain

Production Management Office (PMO)

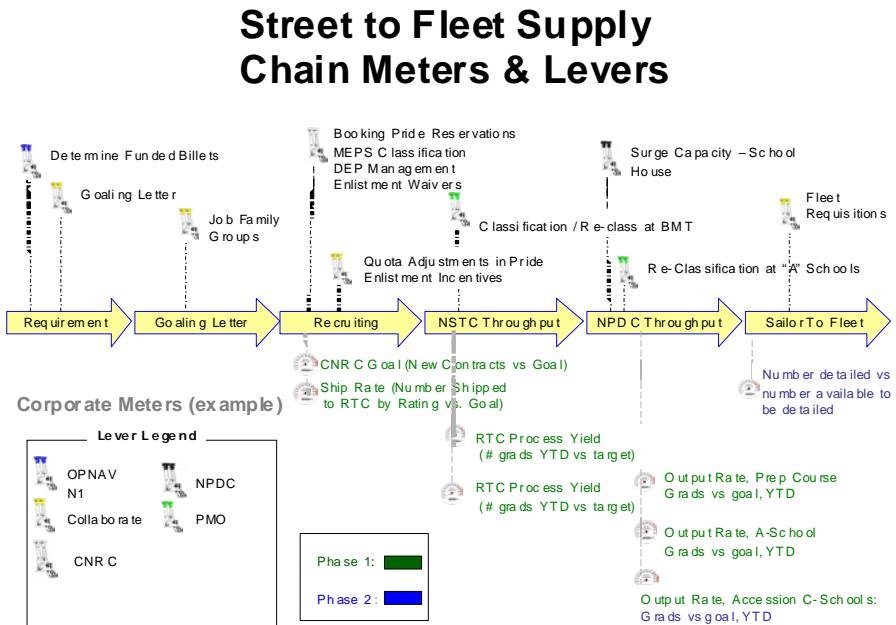
Mr. George Taylor (PMO) gave a presentation on the need to apply corporate supply chain concepts to Navy accessions. Mr. Taylor said that the Manpower Personnel Training and Education (MPTE) Supply Chain Council recognized the need for visibility into our "inventory" across the entire supply chain, establishing benchmarks to measure/manage variation in supply chain, and developing corporate-level key performance metrics. He said that the council developed the concept of a new organization that would monitor and report on the performance of the Navy Enlisted Accession Supply Chain (NEASC). The concept was formalized as the PMO, with official establishment occurring on January 24, 2008.

Mr. Taylor reported that industry finds value in the supply chain for many reasons. First, total real-time visibility of inventory is essential. When the strategy/business model is well-defined, the supply chain is designed to achieve it. It provides clear focus for meeting customer's needs. The supply chain makes cultural change a requirement. There is also a need for common vocabulary/taxonomy. Business rules, as well as roles and responsibilities, must be clear. The supply chain must have the support of leadership and a dedicated, empowered production manager.

MPTE working group (MPTE WG) and MPTE flag session were established to address issues that affect efficiency and effectiveness of operations within the MPTE domain.

Mr. Taylor discussed several of the main problem areas. First, FY07 accession students spent over 202,000 man-days in Awaiting Orders (AO) status—AO Team. Second, another 435,000 man-days were spent in Awaiting Instruction (AI) status—AI Team. Third, fragmented visibility and incomplete control were suboptimizing significant supply chain functions: reclassification and quota management.

Figure 41. Supply chain processing from street to fleet^a



a. Presented by Mr. George Taylor (PMO) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

Mr. Taylor presented the approach to metrics and analysis. The first step was to create and deploy enabling tools for MPTE production using the concept of Supply Chain Management (SCM). In addition, the team partnered with NETC and others (CNRC, BUPERS) to build and deploy tools designed to improve the supply chain process. The Weekly Accessions Recruiting (WAR) Report was used for CNRC/PMO Accession Management, integrated into business processes. The Work in Process (WIP) Inventory tool was used for LC/PMO Production Management, integrated into business processes. The ALNAV Tracker was used for ECM/PMO Production and Reclassification Management, integrated into business processes with a fully automated version under development.

Performance-Based Costing

Mr. Mike Sumrall (BearingPoint) and Mr. Richard Gualandi (CNRC) explained that ABC is a cost management tool that links resources to

activities performed, and activities to the service and/or product outputs. The analysts said that ABC has been used to help organizations assign overhead costs to products/services more accurately than previous costing methodologies to determine profitability, “true” net margin, and process costs.

The analysts explained that CostPerform ABC models are PBC models (Performance-Based Costing,) and they provide a clear, shared understanding of outputs and business processes, output costs direct, shared services, and sustaining process costs, process capacities, service delivery costs, costs of outputs, and the function of cross-functional processes.

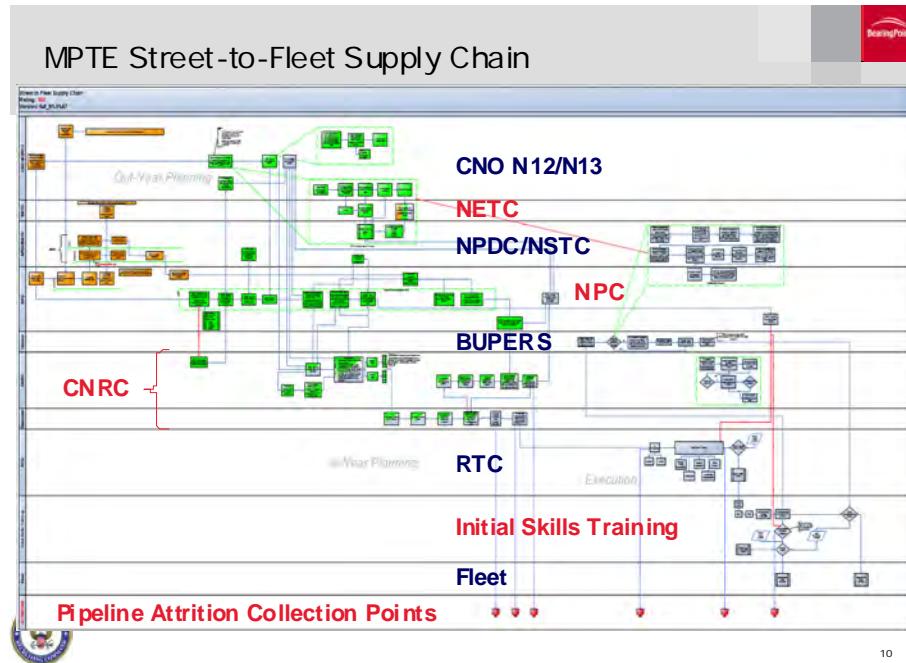
Mr. Sumrall said the challenge is to build relevant and useful cost models that will be built with an end state in mind (e.g., “What will it be used for?”). It should also capture real-world organizational processes: “What is being modeled?” A relevant model should be constructed iteratively: “Did you capture everything?” It should report clearly: “What is it telling me?” The model should be easy to understand: no one ever says, “So what?” It should be built with sustainability in mind: “How hard is it to maintain?” Overall, the enterprise model must capture interdependencies of organizational models: “How do changes in X affect Y?”

In the “Process Based” Costing model, the “ends” (or outputs) are first. Work “flows” through the model based on output quantity and productivity assumptions. The model’s built-in dashboard functionality enables capacity planning and scenario analysis. It can be used to easily change volumes and immediately analyze the impact on the capacity consumption of the different resources (pools).

According to Mr. Sumrall, the Performance Based Costing Model can answer the following questions for Navy Recruiting: What is the cost of delivering a Sailor into the Street to Fleet Supply Chain? Can you help us capture the costs of the processes required to deliver a Sailor to the Fleet? Can you capture these costs by rating and designator?

Mr. Sumrall discussed sample costs. Recruiting costs differ by the type of recruit. Most enlisted ratings cost about \$13,500 without bonuses. The average cost per recruit delivered to RTC was \$18,700 with

Figure 42. The street-to-fleet process and key pipeline points^a



a. Presented by Mike Sumrall (BearingPoint) and Richard Gualandi (CNRC) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

bonuses. Most Active Duty officers cost about \$32,500. Specific program management costs drive unit costs. NRD process costs vary primarily as a function of production volume and manning.

Mr. Sumrall said that a 1-percent decrease in RTC attrition saves 100 enterprise FTEs. RTC graduates cost approximately \$23,000 each. He said that \$823 million was invested in delivering 35,400 RTC graduates in FY06. In conclusion, Mr. Sumrall said that the model does several things. It allows analysts to test effectiveness and cost savings from specific productivity improvement projects, it highlights system losses (i.e., DEP attrition), and it identifies capacity issues.

Simulation Modeling and Analysis of Street-to-First-Contract-Renewal Supply Chain Network: Aviation Mechanical (AMEK) Job Family

The next supply chain presentation was given by eSOL's Mehdi Amini, Ph.D., and Mike Racer, Ph.D., and NPRST's David Cashbaugh, CAPT, USN (Ret); Tom Jones, CDR, USN; Rodney Myers, M.S.; Tanja Blackstone, Ph.D.; and PSC Johnny Little, USN. eSOL creates a collaborative partnership among academic institutions and organizations within the private and public sectors to advance theory; develop solutions, systems, and software; and transfer knowledge and technology relevant to the field of simulation and optimization through funded initiatives.

The key objective is exploring opportunities and challenges in applying the traditional supply chain paradigm to the Navy Manpower and Personnel Supply Chain Network (NMPCSN). The scope is the Aviation Mechanical (AMEK) job family, including aviation machinist's mate (AD), aviation structural mechanic (AM), aviation structural mechanic (safety equipment) (AME), and aviation support equipment technician (AS). The Street-to-First-Contract-Renewal supply chain network is also being explored. The project framework includes visualization through the Value-Stream Mapping (VSM) approach and analysis using a simulation modeling technique.

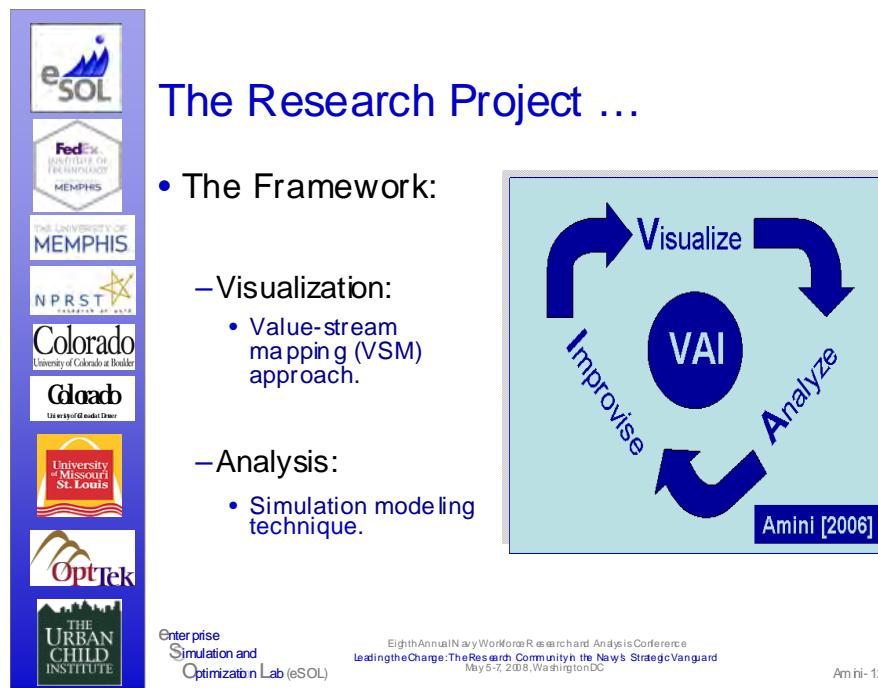
Dr. Amini described the four phases of simulation modeling. Phase I is value-stream map development and validation. Phase II is data collection in which matrices are developed and collected, and sources are identified. In Phase III, data are validated and analyzed. Finally, in Phase IV, base and scenario simulation models are developed.

Dr. Amini presented three simulated scenarios studying the impact of (1) A-school scheduling, (2) missing shipping goals in consecutive months, and (3) latency of overrecruiting the AS rating.

The key conclusions were presented by Mr. Amini and Dr. Racer. First, Value-stream mapping is a viable and effective approach for the NMPSC visualization strategy through mapping, analyzing, and identifying improvement opportunities. Second, the Value-stream

mapping technique may be readily applied to the supply chains of other communities or job families. They said that simulation modeling is a powerful approach for NMPSC visualization and analysis because it promotes understanding of the dynamic and complex as-is behavior of the supply chain and conducting of “what if” scenario analyses. The simulation modeling technique may be applied to other communities or job families. Finally, Mr. Amini and Dr. Racer said that there is potential to effectively use feedback structures to better control throughput. This will require more effort on policy development; some decision will need to be made with respect to prioritizing objectives, and complexity will be an issue.

Figure 43. The framework approach and technique^a



a. Presented by Mehdi Amini, Ph.D., and Mike Racer, Ph.D. (eSOL), et al. at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

Military Incentive Tracking, Accounting, and Payment System (MILITAPS)

Ms. Valerie Hall (SPAWAR) discussed the purpose of MILITAPS. Its first purpose is to track and manage Navy enlistment incentive dollars. MILITAPS assists in forecasting by providing accurate data, to streamline the incentive payment process by identifying the Sailors and their amounts that are ready for payment. The system also provides program managers with a management information system that will consolidate the tracking, accounting, and payment of the Navy's entire enlistment incentive program into one overarching system.

Ms. Hall said that MILITAPS has many benefits. It saves countless man-hours (fleet wide) in recording, processing, tracking, paying, and accounting for EB funds. The system enables complete FY and monthly reconciliation of MPN accounts. MILITAPS also enables more optimal use of incentive resources. Finally, MILITAPS potentially saves millions in bonus overpayments.

According to Ms. Hall, there are new MILITAPS requirements. The Navy requires accurate tracking of Special Operations/Special Warfare (NSO/NSW) candidates' physical training scores from the Delayed Entry Program (DEP) to first assignment. The Navy considers that meeting the PST standards is the first step in making a SEAL to support the Global War on Terrorism (GWOT). Furthermore, reporting is required across the MPTE enterprise. MILITAPS is thought to be an existing web-based system that could be easily modified to support this emerging requirement. MILITAPS could bring together DEP data, RTC data, and NSO/NSW data. The benefits of PST data capture were discussed. First, meeting the PST standards is the first step in making a SEAL to support the GWOT. Data capture helps to reduce schoolhouse attrition at BUD/S. Accurately reflecting PST scores benefits all downstream pipeline activities (i.e., drops, reclass, grads, etc.). Data captures provide for an immediate overall evaluation of the viability of a SEAL candidate's success; candidates' "problem areas" are visually evident and can be targeted for improvement.

Figure 44. MILITAPS Cumulative Sailor Report^a



a. Presented by Valerie Hall (SPAWAR) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

Manpower Planning—Modeling and Simulation

Using Optimization in Manpower Planning

Paul Thornton, Ph.D. (Serco), reported that Navy Personnel Research, Studies, and Technology (NPRST) has developed optimization solvers to match Sailors and jobs, and to match current on board against requirements. He said that the question was whether better performance of the embedded optimization solver could improve these applications and what the upper limit was on problems these solvers could handle. Dr. Thornton said the goal was twofold: to compare and contrast the efficiency of the current solver with industry-standard solvers and determine the limits of the current and industry-standard solvers.

The approach first considered the variables for the problem being solved, including costs, Sailors, and billets. An experiment was designed around the problem dimensions. Then it was necessary to select a common machine for all scenario runs and generate a suite of scenarios. Another aspect was to establish bounds for “reasonable” execution times—approximately 2 hours. The analysts also needed to select commercial solvers for evaluation against NETFLOW: CPLEX LP, CPLEX Barrier, BDMLP, COIN GKLP, COIN CBC. Finally, initial experiments were conducted with a less capable machine to emphasize the execution speed differentials. The dimensions of the scenarios involved the number of billets, the number of Sailors (relative to billets), the density of assignments, and the distribution of costs (skewness and level).

Dr. Thornton’s study concluded that the NETFLOW solver performed the best overall and was able to solve larger problems than the commercial solvers in the General Algebraic Modeling System (GAMS). He reported that, using default settings, the freeware solv-

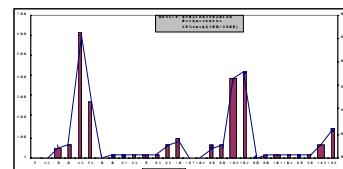
ers of COIN OR performed as well as or better than the commercial solvers. He said GAMS had proven to be an excellent development environment to analyze the performance of the commercial solvers (and build the scenarios). Dr. Thornton stated that future research would run the same scenarios with COIN CBC without GAMS overhead. There would be an extension of formulation to include side constraints. Finally, the analysis would improve the efficiency of the solvers through cuts or bounds.

Figure 45. Dimensions of the scenarios^a

Scenarios

- The dimensions of the scenarios are:
 - Number of billets
 - Number of Sailors (relative to billets)
 - Density of assignments
 - Distribution of costs (skewness and level)

- Billets varied between 1,000 to 4,000 and the associated Sailors ranged between -25%, -10%, +10% and +25%
- Density referred to the percentage of the maximum billet x Sailor, ranging between 3%, 15% and 50%
- Distribution of costs was a mixture of balanced or skewed and percentage of levels (unique values as a percent of #billet) from 1% or 20%



serco

a. Presented by Paul Thornton, Ph.D. (Serco), at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

Hybrid Simulation & Optimization for Navy Manpower Planning and Distribution

Dr. Douglas A. Samuelson, Dr. Steven P. Wilcox, Dr. Paul Thornton (SERCO) gave a presentation on optimization of Navy Manpower Planning and Distribution. According to the analysts, existing

supply-based distribution planning does not seem to have the flexibility to meet changing conditions, and numerous planners have proposed that a position-based “demand-driven” system would provide better utilization of Navy manpower. The first task documents the current system of distribution planning and builds a simulation model that replicates this process. The second task documents and builds a “proposed” system allowing the user to vary selected policies to ascertain the impacts of policy changes on future manning and distribution.

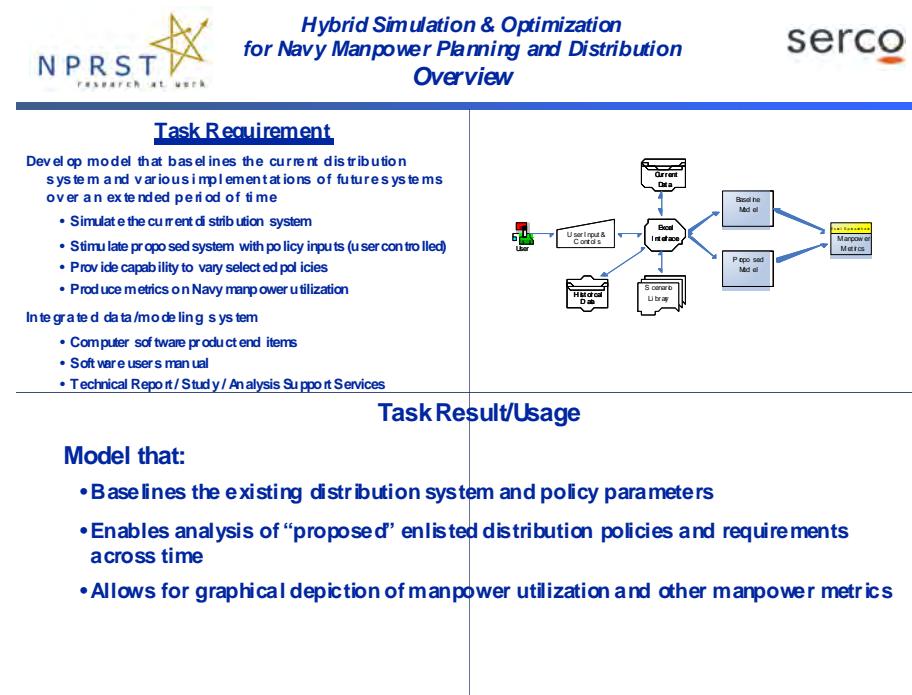
The purpose of the study was to model current enlisted distribution system business rules and policies. The study also incorporated alternative paradigms for distribution and assignment of enlisted personnel. The analysis would then test and compare how variations in policy and paradigm affect manning, sea-shore rotation, and other metrics of interest. The objectives are to fill a higher proportion of high-priority billets and to reduce the number of misfits.

Data requirements for the study included individual enlisted classification and qualification data (EMF), historical distribution outcomes (EMF), force structure information (historical and future), and history of relevant policy lever settings (such as accession mix, promotion timing, sea-shore rotation, MCA prioritization, and grade substitution). Testing/Verification was conducted on the baseline development tied to current methodology, a two-spiral development with increase in complexity and policy variables, test cases to support integration of features and modeling components being incorporated, and integrity of implementation of equations. Verification and validation involved behavioral analysis of the model under use, joint review and analysis with Navy enlisted strength planners, and comparisons of test cases with existing systems and baseline system.

The approaches considered Markov Chain analytical models, discrete-event simulation, agent-based simulation, and microsimulation. The analysts said that past approaches used simple econometric forecasts, which neglect the age-specific structure of the population, and spreadsheet-projections using accounting rules, which also understate some structural effects. They reported that both are hard to manipulate to assess effects of policy changes.

The analysts concluded hybrid simulation-optimization provides a more flexible and realistic representation, a framework to expand the rules within the requisition and assignment modules, and the ability to add rules and enhancements to the simulation of the inventory. It also provides reports and metrics describing the results from the simulation.

Figure 46. Task requirements, results, and use^a



a. Presented by Dr. Douglas A. Samuelson, Dr. Steven P. Wilcox, and Dr. Paul Thornton (SERCO) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

Agent-Based Enterprise Simulation Validation Plan

Mr. John Schmid (CSC), Mr. John Sauter (New Vectors/TechTeam), Mr. Sanjay Nayar (CSC), Mr. Rick Loffredo (CSC), Dr. Colin Osterman (NPRST), Mr. Rodney Myers (NPRST), and Ms. Kimberly Crayton (NPRST) discussed the validation plan for the Agent-Based

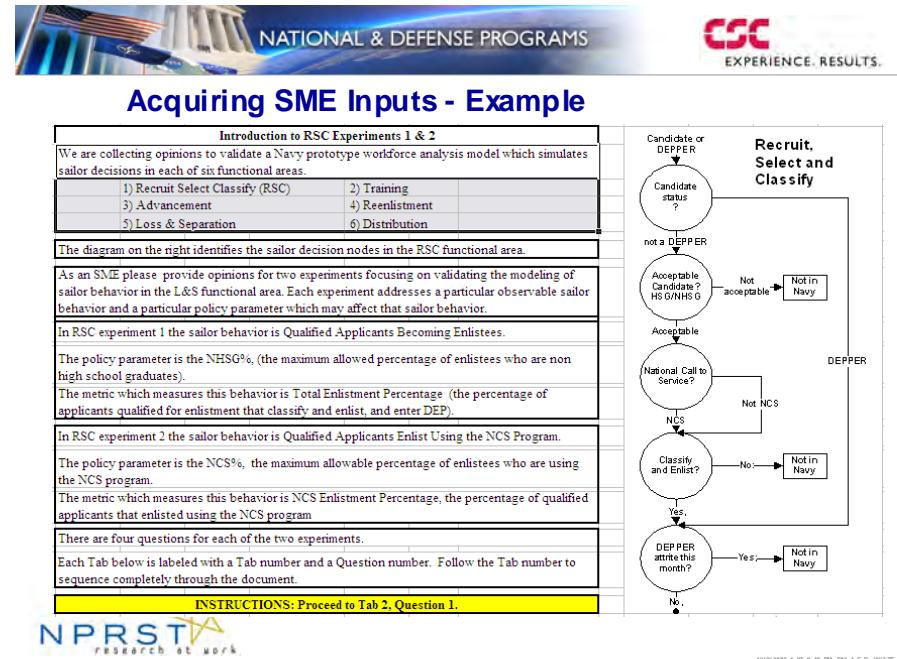
Enterprise Simulation. According to the analysts, the atypical validation has several challenges. First, the Agent-Based Enterprise Simulation to be validated is a Navy MPT&E prototype workforce analysis model. The second challenge is the scope and complexity of the system and its subsystems (functional areas). Third, no one person has all the subject matter expertise necessary to assess the entire system. In addition, there is no existing version of the system and no benchmark to which the results of the simulation can be compared.

The objectives address the following questions. Do simulation predictions reasonably compare to SME expectations? Do simulation predictions compare to historical observations? The methodology involved phased validation. The first phase was qualitative validation of functional area simulation predictions in response to input factor value changes; each functional area simulation was to be validated in isolation. The second phase was qualitative validation of system simulation predictions in response to input factor value changes. The third phase was quantitative validation of system simulation predictions based on comparisons against historical observations.

The analytic team said that validation requires statistically significant simulation results. They ran tests to evaluate sensitivity of the simulation to random seed effects. The team also determined the required number of simulation runs. Experiments were run to determine the variance of the selected metrics at different design points. A qualitative validation of functional area simulations was conducted based on SME opinion.

In conclusion, the analytical team found it useful to use a multi-pronged approach designed to address the atypical challenges in validating an Agent-Based Enterprise Simulation. Validation of each functional area simulation followed by system-level validation was necessary. Qualitative validation experiments designed to solicit and use opinions from SMEs with specific Functional Area (FA) experience added value. This addresses the challenge that no one person has all the Subject Matter Expertise necessary to assess the entire system. Quantitative System validation experiments were used to validate the system simulation outcomes against historical observations.

Figure 47. SME inputs for validation prototype workforce analysis model^a



a. Presented by Mr. John Schmid (CSC) et al. at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

Finally, the model used actual parameters and actual outcomes (for FY04, FY05, FY06 and FY07 by EFY, quarter and month).

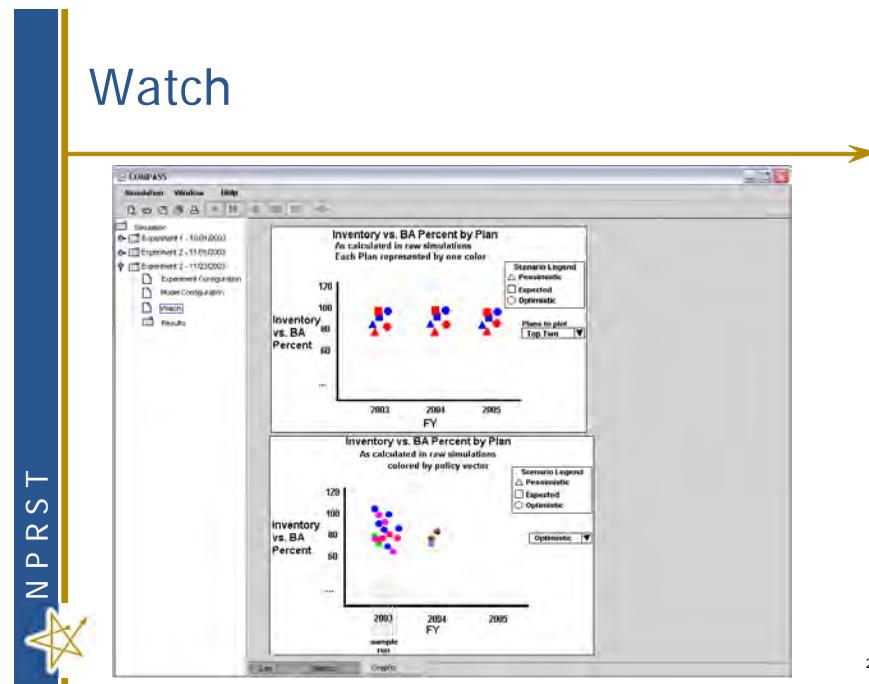
COMPASS: Comprehensive, Optimal Manpower Personnel Analysis Support System

Mr. Rodney S. Myers, Ms. Kimberly Crayton, and Mr. Colin Osterman (NPRST) gave a presentation of the COMPASS model. According to the research team, the modeling objectives include advancement of the “early warning” system, identification of potential problems and opportunities, an executive flight simulator, “what if” analysis to evaluate alternatives, a training platform for decision-makers, and, finally, facilitation of in-depth understanding of the enterprise.

The methodology involved the use of components of the Navy workforce analysis tool: Supply Chain Model of Navy functional processes, computer-based simulation, optimization (resource allocation and policy), and sensitivity analysis.

The analysis team said that the model's targeted uses include problem solving, functional insight and sensitivity analysis of the Navy's workforce, and conducting scenario(s) to analyze personnel inventories at critical paygrades (i.e., midgrade shortages). COMPASS models the following Navy functional areas: recruitment/selection/classification, loss/separation, training, advancement, reenlistment, and distribution.

Figure 48. Scenario simulations in action^a



a. Presented by Mr. Rodney S. Myers, Ms. Kimberly Crayton, and Mr. Colin Osterman (NPRST) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

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Safety

Analytical Tools Describing Life-Cycle Costs of Hazardous Exposures and Benefits of Risk Reduction

Mr. Mark Geiger (Safety Liaison Office) described how cost-benefit analysis has been integral to the progressive systems engineering and human systems integration process. Quantitative models have been developed for two of the most common stress factors affecting the performance and safety/health of DoD personnel; noise and ergonomic stresses. Projects supported by the Defense Safety Oversight Council (DSOC) have described methods to analyze and quantify the impact of alternative designs on personnel costs for human systems integration/ergonomics factors and long-term medical costs for noise exposures. Application of these models will allow upfront influence of systems design rather than less efficient retrofits.

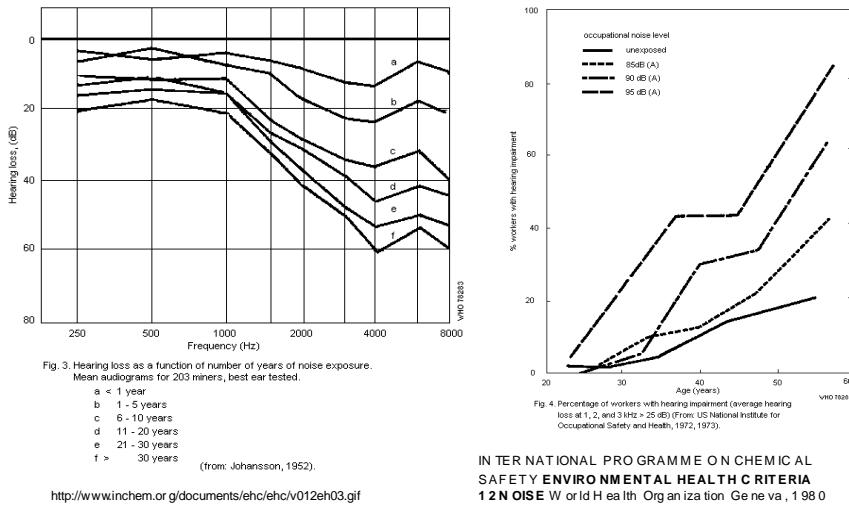
Mr. Geiger found that there is a relationship between exposure and effect. He said it is possible to quantify manpower and economic effects with a predicted cost-benefit analysis associated with noise control technology. Noise dose-response relationships may be modeled to link noise exposure and costs of predictable hearing loss. The DSOC's Acquisition and Technology Task Force applied various projects between 2006 and 2008. The Center for Naval Analyses extended its noise evaluation work to other systems. Approaches have been developed and quantified for proactive evaluation of ergonomic/human systems and to integrate risk evaluations and hazard control in design rather than retrofit.

Mr. Geiger reported that studies of industrial noise and hearing loss recognized a dose-response relationship. The Navy Submarine Medical Research Institute Noise Reduction Study of 2006 found a 5-dB difference between predicted and actual hearing loss. The difference was predominantly due to noise exposure reduction provided by

protective equipment use. CNA applied cost-benefit analysis to shipboard noise reduction from 98 to 85 dB.

Figure 49. Hearing loss as a function of years of exposure^a

Industrial Noise and Hearing Loss Recognized Dose-Response Relationship



a. Presented by Mr. Mark Geiger (Safety Liaison Office) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

Mr. Geiger said that system safety analysis issues may depend on perspective. He suggested that there's a need to integrate multiple discipline approaches. Human systems integration addresses the ineffective use of manpower and the potential benefits of training. System safety addresses worker mishaps and the potential consequences. Ergonomics and occupational safety considers the potential for bodily injury.

The project provided tools and metrics to evaluate tasks, processes, and designs in light of human capabilities, limitations and mechanical stressors that can diminish productivity, increase costs and lead to worker injuries. Human Engineering and Ergonomics (HE&E) Risk Analysis Process, or HEERAP, describes and illustrates tasks with

potential risk factors and helps quantify those risks that involve repetitive motion, lifting, and reaching/awkward postures. The process is composed of two parts. Part 1 is HEERAP, and Part 2 is Human Injury Risk Analysis. The team determined that analytical tools were instrumental in the process of describing life-cycle costs of hazardous exposures and benefits of risk reduction.

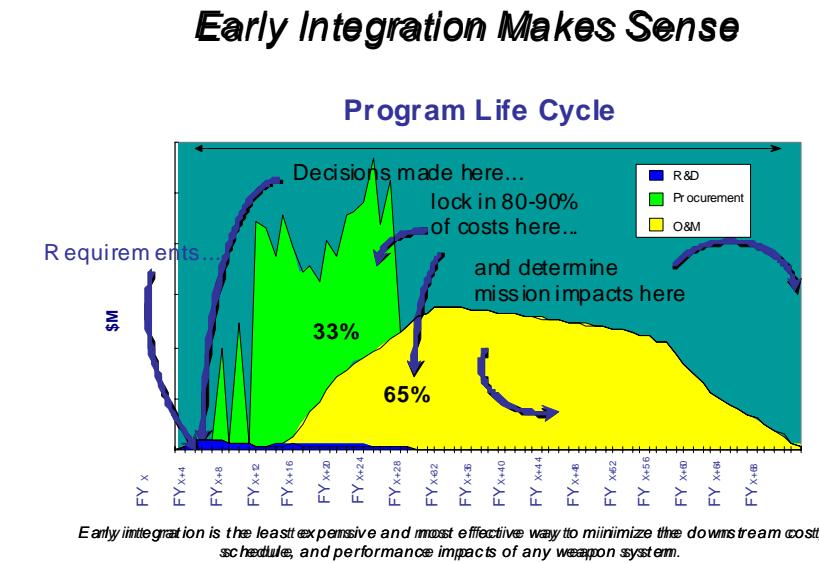
Safety Capabilities That Support Efficiency and Reduced Life-Cycle Costs

Mr. Mark Geiger (Safety Liaison Officer) reported that two-thirds of life-cycle costs are associated with sustainment and support. Reducing system sustainment costs is critical to long-term economy and effectiveness of defense operations. He said that safety and ergonomic evaluations of legacy systems and processes have often identified numerous inefficiencies and supported marked reduction in manpower. Mr. Geiger discussed how application of safety requirements in early stages of the JCIDS process can result in analyses that support reduced manpower cost. These include the requirement for analysis of existing support systems (often inefficient, but overlooked in new systems design), control of stressors that decrease safety and efficiency (heat stress, noise, chemical exposures), and movement of people and materials handling.

Mr. Geiger said that the U.S. Naval Research Advisory Committee (NRAC) estimated that including human elements (i.e., Human Factors Engineering (HFE)) in the initial design phases of ships and equipment could have the following benefits. HFE could improve effectiveness and availability by 30 percent, increase survivability by 15 percent, reduce the number of casualties by 10 percent, and reduce personnel by 20 percent. Furthermore, HFE has the potential for creating significant life-cycle cost savings for the Navy.

Initial analysis reveals that there are various manpower-intensive tasks and safety-health risks that drive later costs. These include movement of equipment and supplies, management of chemical materials (and related safety, health and environmental measures, excessive maintenance demands, and environmental conditions that reduce efficiency, comfort and safety.

Figure 50. Early integration is the least expensive and most effective way to manage program life cycle^a



a. Presented by Mr. Mark Geiger (Safety Liaison Office) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

Mr. Geiger said that improved requirements should make it easier for the users. System designs should minimize or eliminate system characteristics that require excessive cognitive, physical, or sensory skills; that entail extensive training or workload-intensive tasks; that result in mission-critical errors; or that produce safety or health hazards. He suggested the requirements document language read, “The safety and efficiency of existing support systems and equipment will be evaluated. Life cycle cost and risk will be managed by human systems integration (HSI) to improve total system performance and reduce life cycle costs by lowering or eliminating mishap risk through a design process.”

Mr. Geiger summarized by saying that human engineering and process efficiency and safety have major manpower benefits. Materials handling provides many examples. Requirements and guidelines for human systems integration, ergonomics, and safety should be in

capabilities “requirements” documents. The common focus areas include common support equipment, noise control and communication, heat and cold stress, chemical risk management, whole body motions (i.e., shock, vibration, motions affecting balance and effectiveness), and design for safe and efficient maintenance. Designs that maximize human performance capabilities and avoid or minimize stressors that impair safety and efficiency also maximize use of manpower (and support comfort, productivity, and long-term retention).

Enterprise Safety Applications Management System (ESAMS)

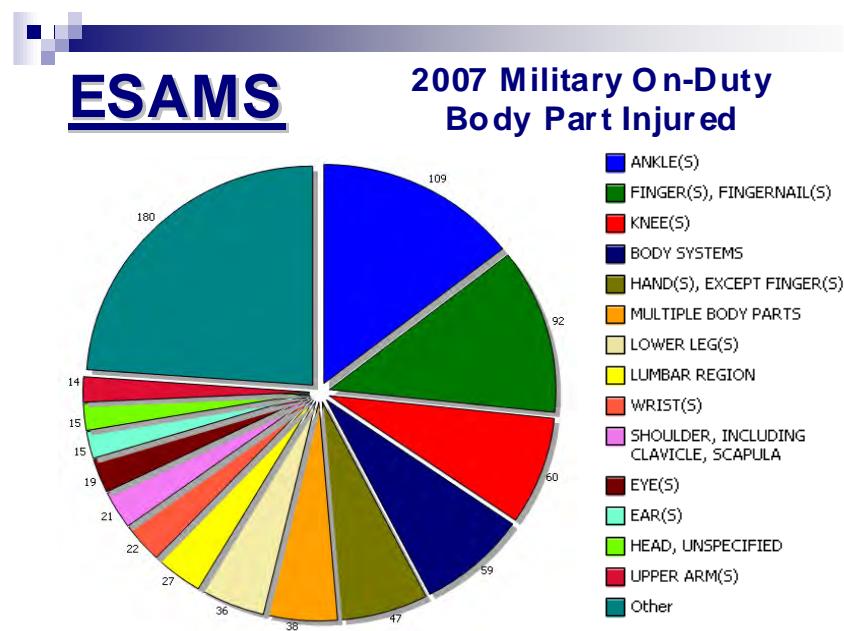
Ms. Laurice Hamilton (HGW & Associates, LLC) began her presentation by stating that ESAMS provides a multilayered approach to data management from the individual to claimant administrators. The chain-of-command can view, edit, store, and trend data. ESAMS allows collaboration and data sharing between regions, commands, and claimants. In addition, ESAMS is a data management system that meets ANSI/AIHA Z10-205 American National Standard for Occupational Health and Safety Management Systems principles.

Ms. Hamilton stated that ESAMS functions through a web-based application, using real-time data management and trending reports and graphs. It offers canned safety metric reports, automated e-mail notifications, and data Excel downloads to the desktop. ESAMS also allows data transfer to other DoD systems. The system has a long list of applications. It allows mishap reporting, near miss reporting, mishap prevention corrective action tracking, unsafe/unhealthful reporting, efficiency abatement tracking, training statistics and data, self-assessment review and documentation, customer service surveys, hazard area tracking, equipment tracking, supervisor tools, and web training.

ESAMS mishap analysis reports allow administrators to search by year, command type, command, installation, and program. The following is a list of current mishap fields displayed for analysis: Body Part, Job Title, Department/Code, Cause Code, Occurred During, Source of Injury, Injury Type, Accident Type, Location, Activity at Time of Injury, and Supervisor.

Ms. Hamilton explained that ESAMS will be able to capture population data by command and installation, calculate summary rates for an installation by command, create expanded graphs and charts, perform expanded mishap data collection, and produce mishap prevention corrective action metrics and statistics.

Figure 51. Chart of injury type^a



a. Presented by Ms. Laurice Hamilton (HGW & Associates, LLC) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

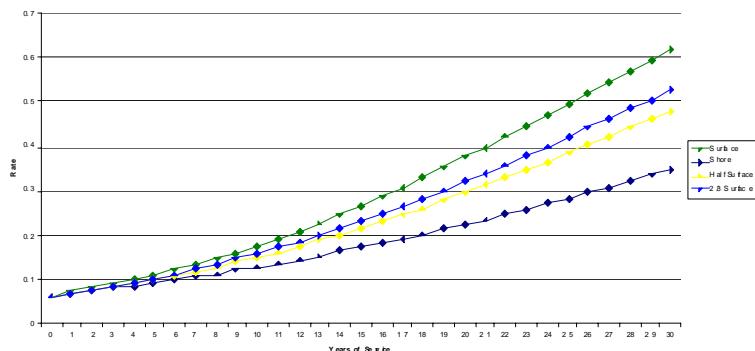
Update on Hearing Impairment Among Navy and Marine Veterans Using VA Data

Dr. Robert P. Trost and Mr. Geoffrey Shaw (CNA) presented an update of their previous findings on hearing impairment among Navy and Marine veterans. According to Dr. Trost, there is ample evidence that noise on Navy ships and aircraft causes hearing loss. VA costs of hearing loss payments have soared in recent years. Trost and Shaw (April 2007, *Military Medicine*) have found evidence of hearing

loss among Sailors using Defense Occupational and Environmental Health Readiness System (DOEHRS) data combined with data on individual personnel assignments during Navy careers. In that paper, they estimate that the probability of hearing loss is nearly 0.5 after a 30-year career, nearly 0.3 after a 20-year career, and nearly 0.1 after a 4-year career.

Figure 52. Hearing loss statistics^a

Probability of Hearing Loss from Shaw and Trost (2007)



a. Presented by Dr. Robert P. Trost and Mr. Geoffrey Shaw (CNA) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

In the current study, Dr. Trost and Mr. Shaw update previous findings with a sample of approximately 2.4 million Navy and Marine Corps veterans who entered the service after 1976 and exited the service before April 2007. Of these veterans, about 56,000 were in the VA system on April 2007, having been diagnosed by the VA with a military-related hearing impairment of either hearing loss or tinnitus.

Their analysis of this new dataset allowed them to draw the following conclusions:

1. The VA data are useful for computing the relative risk of hearing impairment across different job categories and platforms.
2. The VA data are useful for computing the relative explicit dollar benefits of noise reduction for different jobs and platforms.
3. The VA dataset is not useful for computing the implicit dollar benefits of noise reduction.
4. The number of veterans being diagnosed by the VA with hearing impairment is less than the number actually being harmed.
5. There is a censoring problem in the combined VA/CNA dataset, especially at the upper career years.
6. To estimate the percentage of veterans who are harmed by noise for different lengths of military service, it is best to use discharge medical data on hearing tests and combine this information with the CNA data set.
7. To predict the percentage of veterans who will be at the VA with military-related hearing impairment at any future date, one needs to specify and estimate a dynamic model of military hearing impairment, entry into the VA system, and exit from the VA system.

Individual Characteristics That Influence Performance

Relationships Between Personality Dimensions Assessed by NCAPS and the Big Five

Ms. Donna K. Roland, Mr. Ronald M. Bearden, and Mr. Hubert T. Chen (NPRST) discussed the benefits of the Navy Computer Adaptive Personality Scales (NCAPS). NCAPS, along with the Armed Services Vocational Aptitude Battery (ASVAB), leads to better selection and classification, improved person-job fit, increased job performance, decreased attrition, and enhanced job/career satisfaction. To use NCAPS operationally, it must be inexpensive, highly reliable, valid for important criteria, legally defensible, and easily administered. NCAPS is a secure web-administered set of 13 personality measures. It is completed in less than 30 minutes, has good reliability estimates, and is predictive of Navy job performance.

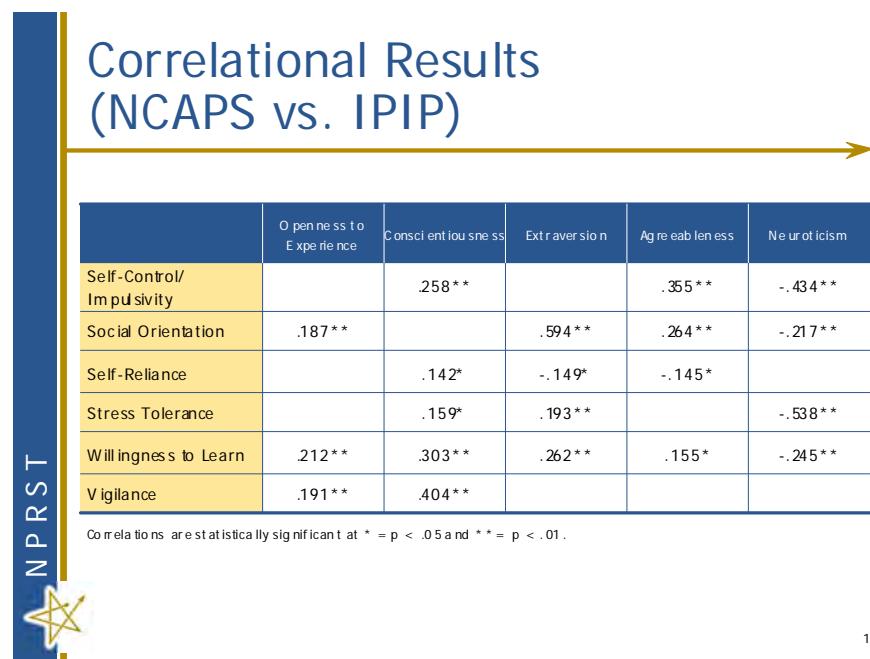
The research team said that NCAPS delivers the benefits of computer-adaptive testing (CAT) technology: lower per-test cost, lower maintenance costs, short administration time, more precise measurement, and increased user acceptance. Furthermore, the methodology uses the Zinnes-Griggs Pairwise Ideal Point IRT Model for adaptive item presentation, and the trait content is intermixed across items. These methodological features make NCAPS largely resistant to faking, unlike most personality tests.

NCAPS assesses traits required for success across most Navy jobs. The traits measured are Achievement, Adaptability/Flexibility, Attention to Detail, Dependability, Dutifulness/Integrity, Leadership Orientation, Depth of Thought/Perceptiveness, Self-Control, Self-Reliance, Social Orientation, Stress Tolerance, Vigilance, and Willingness to Learn.

According to Ms. Roland, the construct-related validation study of NCAPS with the Five Factor Model (FFM) sought to determine relationships between NCAPS traits and FFM representation of personality. The study developed a priori hypotheses linking the 13 traits to the 5 factors. In addition, the study identified possible gaps in NCAPS trait coverage. The FFM personality factors, considered to be the gold standard in personality measurement, are openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism.

The study participants were 220 students from the University of Memphis, both male and female, predominantly African-American and white, with a small percentage of Asian and Hispanic students. Both NCAPS and a 100-item set from the International Personality Item Pool (IPIP) were administered online. The analysts provided summary statistics and correlational results showing the relationship between NCAPS traits and the IP.

Figure 53. NCAP success traits and Five Factor Model^a



a. Presented by Ms. Donna K. Roland, Mr. Ronald M. Bearden, and Mr. Hubert T. Chen (NPRST) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

In conclusion, the results suggest that all of the NCAPS traits are somewhat encompassed by the FFM, with many being highly related. The results also support the assertion that NCAPS is a viable personality test conforming to current psychological and educational usage guidelines. Finally, additional results provided evidence of the NCAPS ability to predict job performance.

SYRUS: Individual Differences in Multitasking Ability

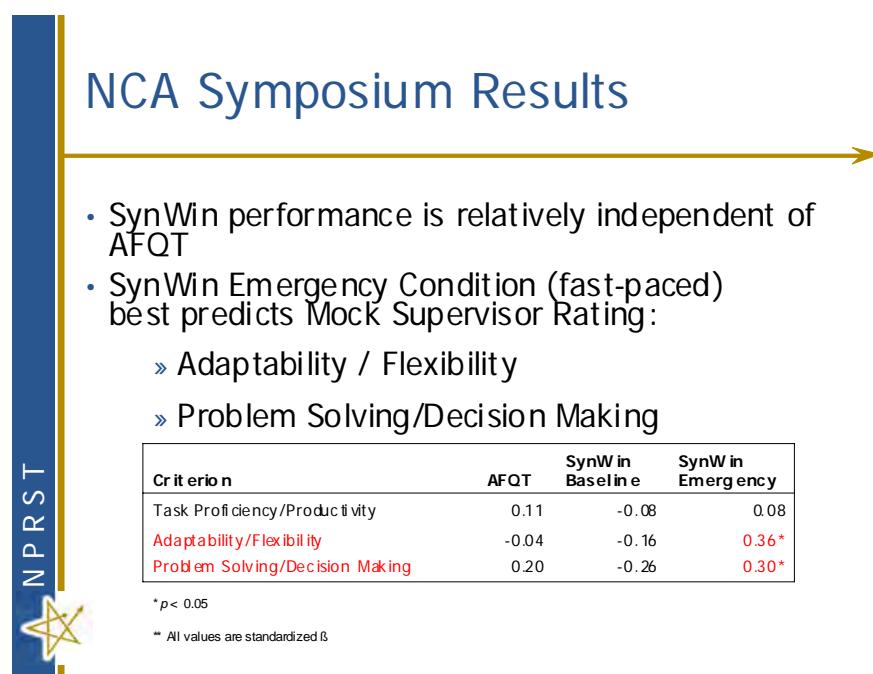
Mr. Hubert T. Chen, Mr. Ronald M. Bearden, and Ms. Donna Roland (NPRST) (BUPERS-1), along with Frederick L. Oswald, Ph.D., and David Z. Hambrick, Ph.D. (Michigan State University), gave a research presentation on the multitasking requirements and assessments for Sailors. Sailors must be increasingly capable of performing broad-sweeping duties in wide-ranging and often hostile environments. The Navy has expressed an explicit need for tools that help us to understand, measure, and predict Sailor multitasking ability. Multitasking assessment does not exist in Sailor selection, and multitasking metrics are not considered in the job classification process.

The analysts explained that SYRUS provides multitasking qualifiers by which to assess Sailor multitasking ability. Performance on multiple tasks are differentiated by the physical and psychological nature of the task, task structure, task timing, the task control, task outcomes, conscious shift from one task to another, short time span, objective information, and subjective information. The goal is to classify Sailors effectively and to predict job and training performance outcomes. A Multitasking Assessment Battery (MAB) looks at cognitive, noncognitive, and dynamic work task components.

The study team tested 230 Sailors (E-5 through E-9, NECs 2186, 2612, 9580, 9585, 9588, and 9589) in all warfare areas during the Navy Counselor Association (NCA) Symposium in Dallas, TX. Data were also collected at Naval Hospital Corps School (NHCS) Great Lakes, IL. The results from the NCA Symposium and the preliminary results from the NHCS were discussed. The team concluded by stating that future direction would include fleet testing using Behaviorally Anchored Rating Scales (BARS) to assess Sailor performance by determining the validity of multitasking measures. This would be in

addition to ASVAB and other g scales and NCAPS personality and other noncognitive measures. Also, job-specific taxonomy would address job vs. ability sets (DNA approach) and a top-down and bottom-up approach.

Figure 54. Task proficiency in baseline and emergency conditions^a



a. Presented by Mr. Hubert T. Chen, Mr. Ronald M. Bearden, and Ms. Donna Roland (NPRST) (BUPERS-1), along with Frederick L. Oswald, Ph.D. and David Z. Hambrick, Ph.D. (Michigan State University), at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

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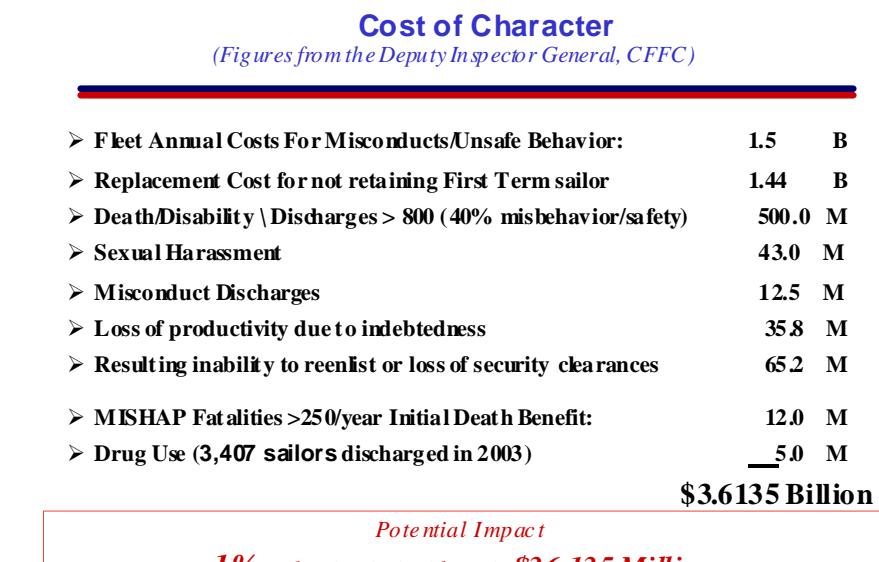
SMARTS Measuring Individual Characteristics To Predict Performance

CDR Jim Pfautz (USN) discussed the System Measures Assesses & Recommends Tailored Solutions (SMARTS) management tool. CDR Pfautz stated that without a system that monitors, measures and helps manage organizational characteristics, improvement initiatives will continue to fall victim to the shiniest fad, the newest boss, or the latest

political agenda. He said that SMARTS offers a Total Force diagnostic and development platform that aligns workforce behaviors with desired characteristics by getting the right support, to the right person, at the right time.

CDR Pfautz said that SMARTS was designed to measure “character” and deck plate behaviors in the fleet, such as legacy training, optimal training, and projected effects. SMARTS combines “soft” measurements with hard science. For example it provides predictive analytics and a real-time feedback loop, automated 360 leadership assessment, data warehousing and artificial intelligence, and individual and organizational metrics and analysis. These are combined with statistics for yesterday’s averages, modeling for today’s constraints, and predictives for tomorrow’s potential. A case study for the Deputy Inspector General provided analytical results for the “cost of character.” The results revealed substantial savings that could result from a small change in character-related incidences.

Figure 55. Cost savings impact for reduced character deficiencies^a



a. Presented by CDR Jim Pfautz (USN) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

Based on a report in the *Military Times*, April 24, 2008, “USS Chosin and USS Stout were found unfit for sustained combat operations” for the following reasons: “low standards; low initiative,” “inability to train junior people,” “[missing] chain of command,” “air of irresponsibility,” and “lack of command involvement.” SMARTS has the potential to assess these issues so that they can be improved.

In conclusion, CDR Pfautz said that SMARTS has a fleet response rate over 70 percent. In addition, it is used by both the joint and civilian community. SMARTS foreshadowed other, potentially more powerful organization-improvement utilities. The methodology is effective for researching character, workforce development, and readiness. According to CDR Pfautz, SMARTS is effective for researching other areas, such as retention, attrition, safety, and readiness.

An Empirical Method for Determining Destroyer Squadron (DESRON) Team-Based Proficiencies From Task Analysis

Mrs. Sara M. Russell (CNA) presented her analysis on identifying DESRON team-based proficiencies to maximize training and performance. The goal of the study was to create a manageable list of the most critical and frequent tasks DESRONs perform and assess which proficiencies are adequately covered in current DESRON training and assessment. The assessment involved conducting observations of DESRON staff training events, interviews with SMEs (east and west coast DESRON staff members and trainers), reviews of current Navy Mission Essential Task Lists (NMETLs), reviews of literature and past studies, and the vetting of a final task list through SMEs.

A task survey conducted with seven DESRON staffs resulted in commodore- and staff-assigned ratings to prioritized events. On the basis of these ratings, significant tasks were uncovered and a principal components analysis was conducted to determine underlying factors and competencies. The six factors/competencies included were decision-making, coordinating/communicating using different information components, maintaining situational awareness, conducting risk assessments, adapting/responding to change, and reviewing/understanding content-specific (procedural) knowledge.

Figure 56. Generated tasks measured through survey^a

Task Survey

CNA

- 93 Total Tasks
- 7 DESRON Staffs Surveyed (N = 59)
- Enterprise, Lincoln, Reagan, Stennis, Nimitz, Roosevelt, Kitty Hawk
- All surveyed but 2 had deployed at least once as part of DESRON
- 78% Response Rate

Task (41)

Coordinate force assets to classify contacts

Importance

NOT LESS IMPORTANT MORE VERY

Compared to your other tasks, what is the importance of this task to achieving your missions?

Frequency

5% 25% 50% 75% 100%

Select the approximate percentage of time you perform this task in an average week.

Difficulty

NOT LESS DIFFICULT MORE VERY

Rate how hard it is for you to complete this task compared to your other DESRON tasks. The rating should be based on how difficult you personally find the task to be, not how hard people in general think the task is.

NEXT

4

a. Presented by Mrs. Sara Russell (CNA) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

According to Mrs. Russell, the current team-focused exercises used in DESRON training should remain (classroom, virtual, and synthetic exercises). The Navy should explore ways to measure the proficiencies of decision-making and adapting to change. Mrs. Russell said that it is difficult to assess these proficiencies at a tactical level (NMET assessment focused only on tactical outcomes). Therefore, she suggests the use of a measure, such as the Team Interaction Profile. She also recommends that analysts continue working to standardize the feedback loop in NMETL creation to include DESRON staff members. Finally, she said that assessments of task frequency, importance, and difficulty should periodically be conducted to ensure adequate representation/focus of critical tasks in training.

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Recruiting Issues

Results of Initiatives To Increase Naval Special Warfare/Operations Accessions

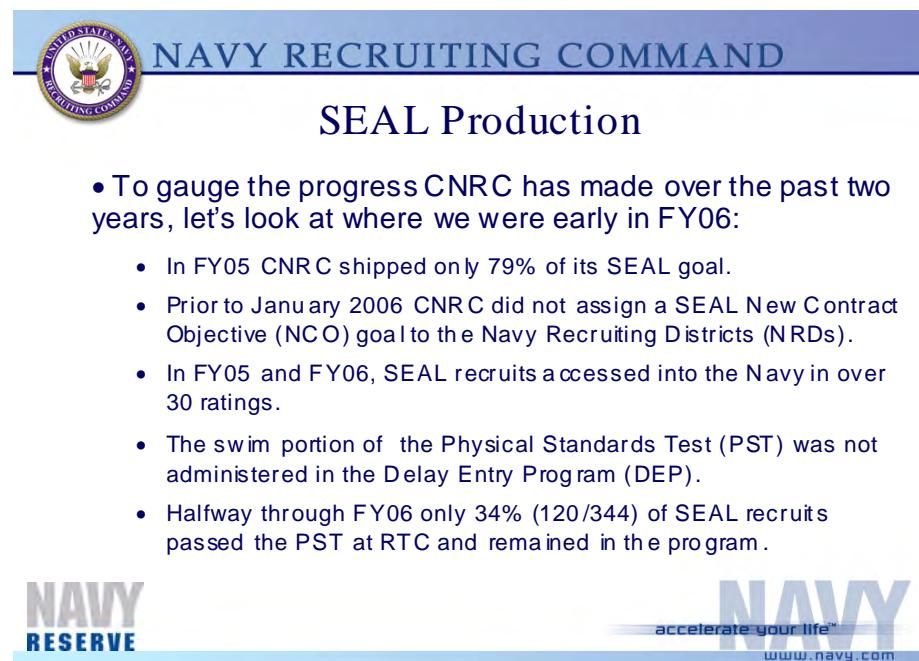
Mr. Mike Evans (Navy Recruiting Command) discussed the results of training pipeline initiatives for SEAL candidates. Mr. Evans said that, historically, program attrition in the Navy Special Operations (SPECOPs) training pipeline has been high, especially for SEAL candidates. With the increased focus on the Global War on Terrorism (GWOT), the demand signal from the fleet for SPECOPs personnel has increased dramatically. Mr. Evans explained that the Navy Special Warfare Command (NAVSPECWARCOM) is increasing enlisted SEAL endstrength from 1,770 to over 2,200 by FY11. To satisfy this requirement, the training pipeline must increase its output of qualified SEALs to the fleet. It takes approximately 2.5 years of specialized training to produce a deployable SEAL.

Early in FY06, NAVSPECWARCOM approached CNRC regarding the high attrition in the SEAL training pipeline and requested that CNRC increase the quantity and improve the quality of SEAL recruits. CNRC responded by implementing numerous program and policy changes with the goal of increasing the quantity and improving the quality of the SEAL recruits delivered to the training pipeline. Mr. Evans' presentation focused on the efforts and results attained in the SEAL training pipeline, although similar results were obtained across all NSW/NSO ratings.

Early initiatives of August 2005 included the addition of expert staff and the assignment of SEALs to assist in recruiting efforts. New goals were established in January 2006, and new incentives were subsequently added, including SEAL enlistment bonuses from \$20,000 to \$40,000. Ensured Physical Screening Test (PST) standards for SEAL recruits are met by requiring them to pass PST in the DEP. Manpower

was increased in the form of new administrators and mentors. A new contract with the YMCA was established. Mr. Evans reported that, with these new policies and procedures in place, progress was made by CNRC. By the end of FY06, 54 percent of SEAL recruits passed the PST at Recruit Training Command (RTC) and remained in the program. In FY06, CNRC shipped only 59 percent (829/1,400) of its goal; however, the quality of the recruits sent to RTC was much higher.

Figure 57. The state of SEAL production in early FY06^a



The slide is titled 'SEAL Production' and is part of the 'NAVY RECRUITING COMMAND' presentation. It features the Navy Recruiting Command logo on the left. The slide lists several bullet points detailing the state of SEAL production in early FY06.

- To gauge the progress CNRC has made over the past two years, let's look at where we were early in FY06:
 - In FY05 CNRC shipped only 79% of its SEAL goal.
 - Prior to January 2006 CNRC did not assign a SEAL New Contract Objective (NCO) goal to the Navy Recruiting Districts (NRDs).
 - In FY05 and FY06, SEAL recruits accessed into the Navy in over 30 ratings.
 - The swim portion of the Physical Standards Test (PST) was not administered in the Delay Entry Program (DEP).
 - Halfway through FY06 only 34% (120/344) of SEAL recruits passed the PST at RTC and remained in the program.

a. Presented by Mr. Mike Evans (Navy Recruiting Command) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

Mr. Evans said that the FY07 initiatives were also productive. With new policies and procedures in place, by the end of FY07 over 81 percent of SEAL recruits passed the PST at RTC and remained in the program. CNRC shipped 91 percent of its SEAL accession goal (1,270/1,397). The FY08 initiatives and policy changes were also effective. With these new policies and procedure in place, CNRC made

progress midway through FY08. For FY08, YTD shipping is 108 percent of goal (512/480), accessed + DEP is over 99 percent (1,082/1,089), level loading of shippers for FY08 is on track, pass and remain in program at RTC for SEALs is 88 percent, pass and remain in program at RTC for NSW/NSO/AIRR is 81 percent, and NSW/NSO/AIRR shipping cycles are more efficiently aligned to better facilitate NSW/NSO/AIRR Divisions at RTC and NSW.

Does the Strength of the Economy Affect Not Just the Quantity But Also the Quality of Recruits?

Dr. Jeremy Arkes (NPS) discussed the impact of the economy on the quality of recruits. Dr. Arkes started by citing the common finding that recruiting is easier when the economy is weaker, both nationally and locally. Further, he said the evidence indicates that the military shifts recruiters to weak economic areas (Arkes and Kilburn, 2005). It may not be optimal, however, to shift recruiters to weak economic areas because a weak economy could hurt the quality of recruits. Dr. Arkes stated that a weak economy can lead to expanded black market for drugs, family strife over money troubles, neighborhood decline, teen depression from family/neighborhood changes or own lack of money, and more free time for teens. These factors could then, in turn, cause troubling teen behaviors and outcomes.

The study produced an empirical model with state and year fixed effects to describe four key undesirable behaviors and outcomes: crime, substance abuse, fertility, and weight gain. The models were based on individual-level data from the 1997 National Longitudinal Survey of Youth. The results show that a weak economy (measured by state unemployment rates) leads to more marijuana use, leads to more cocaine use, and may lead to increased use of alcohol and cigarettes. Results were categorized by gender and race. In addition, more teenagers sell drugs when the economy is weak. Also, when the economy is weak, female teens gain weight and male teens lose weight. Finally, there is evidence that, since 1991, unlike in previous periods, teen births increase when the economy is weak.

Figure 58. Modeling behavioral impact on recruits in light of the economy^a



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Standard Empirical Model

$$Y_{jst} = \gamma UR_{st} + X_{jst}\beta + \mu_s + \tau_t + \varepsilon_{jst}$$

j = individual (except for aggregate models)
 s = state
 t = year
 Y = outcome (drug use, crime, births, weight)
 UR = unemployment rate
 X = other individual-level or area-level factors
 μ_s = state fixed effects
 τ_t = year fixed effects

γ is the effect of within-state changes in the unemployment rate on within-state changes in the outcome

a. Presented by Dr. Jeremy Arkes (NPS) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

In summary, Dr. Arkes stated that a weak economy could hurt quality by leading to more use of drugs, alcohol, and cigarettes, more drug-selling, and weight gain among young women. Theoretically, it would also increase the number of otherwise unemployable recruits. A weak economy could help quality by leading to weight loss and lower obesity among men. He said a weak economy leads to more teen births with effects on quantity/quality of force that are uncertain. Dr. Arkes said, in conclusion, that a weak economy leads to more recruits but perhaps a lower quality of recruits, which may suggest that focusing on weak economic areas may not be optimal. He pointed out that further research could test this more precisely by examining whether the quality of recruits decreases in an area when the economy weakens.

Generation Y and Navy Recruiting: Targeting the Next Generation of Navy Civilians

Ms. Ruby DeMesme, Ms. Andrea Nagy, and Mr. Zev Goldrich (Bearing Point) discussed Generation Y and the challenges for Navy recruiting. The team described Generation Y as the age group most often associated with the birth years between 1979 and 2000. The population includes roughly 73 million people in the United States.

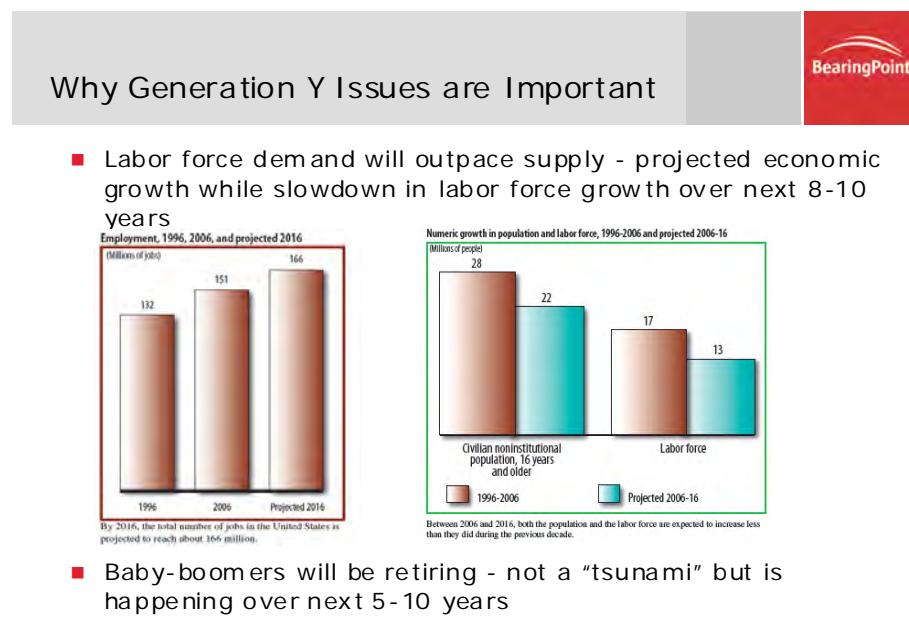
Ms. DeMesme and the team contend that Generation Y issues are important for several reasons. First, the labor force demand will outpace supply—projected economic growth accompanied by slowdown in labor force growth over the next 8 to 10 years. Second, baby-boomers will be retiring—not a “tsunami” but significant retirements over the next 5 to 10 years. Furthermore, they stated that the competitive landscape is changing: there will be greater competition among employers for ANY talent, especially among professional and business services and healthcare and social assistance sectors. The workforce landscape is changing: four generations are in the workforce at once for the first time, and Generation Y is the fastest growing segment of labor force due to higher birth rates than Generation X.

Ms. DeMesme and the research team noted that the media has labeled Generation Y with many popular stereotypes. More thorough research studies, however, suggest that the generational differences may not be quite as great as portrayed.

The team suggested that there may be some particular federal recruiting challenges and Navy impacts. For example, the lengthy federal hiring process puts the government at a competitive disadvantage, the federal government is often competing with private industry for job candidates, and Information Technology Exchange Program (ITEP)—the exchange of employees between federal government and private industry—has been unsuccessful. The Navy may have particular challenges for the following reasons. First, the Navy lags behind in marketing its civilian jobs to Gen Y. The Navy effectively markets military opportunities through Navy.com, as well as TV, radio, and other media. Navy jobs are often posted on USAJobs, but it is not often used by Gen Y to uncover civilian military opportunities.

Several Navy components are well aware of this problem and have made some strides at their individual component levels with internships and college visits. The analysts believe that Generation Y has yet to be addressed in a holistic manner Navy-wide.

Figure 59. Labor force demands push generational issues to the table^a



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a. Presented by Ms. Ruby DeMesme, Ms. Andrea Nagy, and Mr. Zev Goldrich (Bearing Point) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

The study team said, in conclusion, that the Navy needs better recruiting strategies, including better job announcements, cohesive brand imaging, and better use of technology. The team also suggested that improvements within the workplace can make it more attractive to Generation Y employers and aid in recruitment efforts, such as structured mentorship, flexible work arrangements, and tuition reimbursement.

Recruit Quality and Enlisted Performance

Dr. Ed Schmitz and Mr. Michael Moskowitz (CNA) gave a presentation on recruit quality and performance. Dr. Schmitz reported that the quality of new recruits has been at its highest level ever over the last few years. He said that 95 percent of new recruits have been high school graduates. In FY05, nearly 75 percent tested at the 50th percentile or higher on the Armed Forces Qualifying Test (AFQT). The study sought to determine what would be the impact on resources and performance if the Navy needed to change enlistment standards by reducing recruit quality.

The study team was able to identify key performance indicators that could be used to identify the impact of changes in recruit quality. Furthermore, they found that another recruiting measure—time spent in the delayed entry program (DEP)—had a substantial impact on performance, and was likely to be affected by the recruiting environment.

Dr. Schmitz and Mr. Moskowitz applied a model of recruiting policies and first-term outcomes to produce results to assist in making policy recommendations. Three behavioral models were used: DEP completion (accession), 48-month completion, and Promotion to E-5. The methodology used logistic regression. Data sources included DEP completion: FY99-06 contracts, and completion & promotion, and FY99-03 accessions data. Results from the analysis revealed that time in DEP reduces accession probabilities for graduates but increases first-term survival. AFQT is a strong predictor of promotion.

Dr. Schmitz and Mr. Moskowitz addressed the current recruiting challenges and the appropriate response. Recruiting missions are increasing for FY08 and beyond. Additional recruiters are planned but have not yet entered production. The question is, should the Navy continue to draw down DEP, lower AFQT standards (e.g., from 35 to 31), and accept more nongraduates (B cells)?

Dr. Schmitz and Mr. Moskowitz reported several key findings. The team identified three major policy levers that affect recruiting and performance: percentage nongraduate/GED, minimum AFQT enlistment standard, and time in DEP. The analysts said that

recruiting policies should focus on maintaining a healthy DEP pool. Finally, increasing nongraduates (especially GEDs) should be considered if recruiting difficulties persist.

Figure 60. Impact of policy variables on performance measures^a

Time in DEP, Education and AFQT affect different performance measures

Variable	DEP completion	48 mo continuation	E5 promotion
Months in DEP			
Seniors	Pos	---	Pos
Workforce	<u>Neg</u>	<u>Pos</u>	Pos
AFQT	<u>Neg</u>	Pos	<u>Pos</u>
Education (vs. HSDGs)			
Senior	<u>Neg</u>	Pos	Pos
Non-grad	---	<u>Neg</u>	<u>Neg</u>
GED	Neg	<u>Neg</u>	Neg
College grad	Neg	---	---

9

a. Presented by Dr. Ed Schmitz and Mr. Michael Moskowitz (CNA) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

Stress on the Force

Assessing the Effects of Individual Augmentation on Navy Retention

Dr. Ron Fricker and Dr. Sam Buttrey (NPS) evaluated the effects of Individual Augmentation (IA) on Navy retention. IAs are individual Sailors and officers sent to augment other (often non-Navy) units. These assignments are different from usual Navy deployments in that they involve individual vice unit deployment, often with little notice. Their research question was: Does IA affect Navy retention? With almost 20,000 AC Sailors and Navy officers IA deployed in the past 6 years, Navy leadership is interested in whether it's hurting retention.

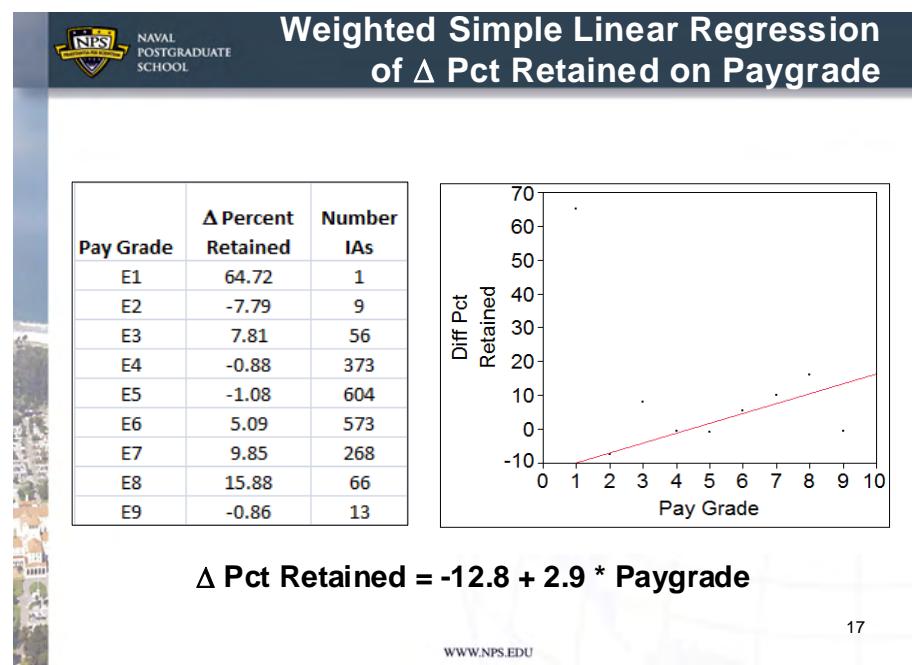
Dr. Fricker and Dr. Buttrey modeled Navy enlisted personnel at their reenlistment decision point and junior officers at the end of their initial service obligation. They then compared the retention rates of those who had an IA deployment before their decision ("IAers") with those who had deployed but not on an IA deployment ("non-IAers"). The team used IA data (OPNAV Pers-4) and USN data (DMDC).

The team's analysis was based on observational information from administrative datasets, but lack of data prevented the analysts from distinguishing IA deployment volunteers from nonvolunteers. They also had to (imperfectly) infer decision points, such as expiration of enlistment contract or end of initial service obligation and deployment experience. Logistic regression models were run on junior officers and enlisted personnel.

Dr. Fricker stated that, thus far, IA deployment is usually associated with higher retention rates and that there are consistent effects for both junior officers and enlisted personnel. However, self-selection and other effects may be present, so one cannot attribute the observed retention rate differences to the IA deployment experience.

Yet, given that "IAer" retention rates are higher in general, the hypothesis that IA deployment causes a significant decrease in propensity to stay in the Navy is seemingly untrue. However, there may be a small negative effect for some enlisted paygrades, and paygrade may be correlated with volunteer status.

Figure 61. Model of enlisted retention rates by paygrade^a



a. Presented by Dr. Ron Fricker and Dr. Sam Buttrey (NPS), at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

Dr. Fricker said that future research should annually assess the aggregate effects and compare nonvolunteers with the rest of the fleet to assess retention impacts. He also suggested that mid-grade officers, warrant officers, and prior enlisted should be evaluated. In addition, IA effects for reservists should be assessed. Other recommendations included evaluating whether IA Sailors have higher rates of involuntary separation, collecting predeployment and postdeployment attitudinal data via a survey, and linking survey attitudinal data to outcome data to evaluate how attitudes translate into actions.

SELRES Manning in Limited-Supply/High-Demand Skills

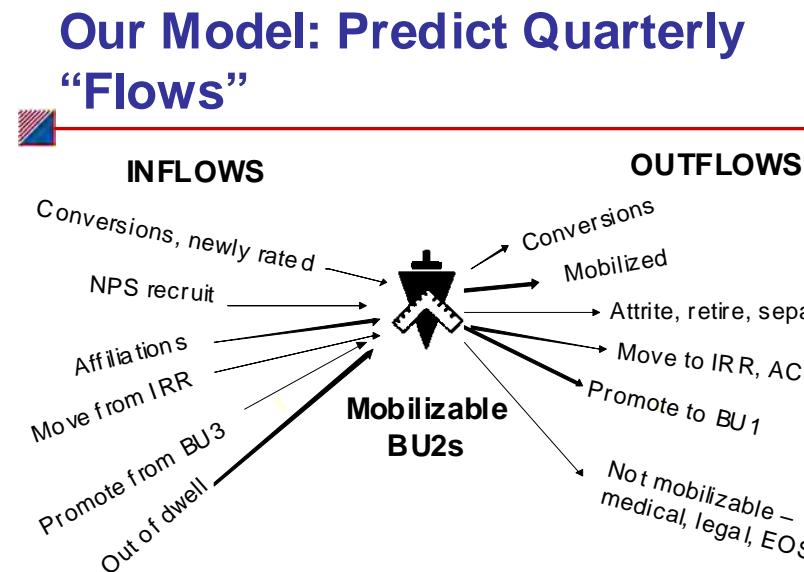
Dr. Peggy Golfin (CNA) presented a study on SELRES manning. She began by stating that the Navy Reserve has been used at historically unprecedented levels in the past few years, in terms of both absolute numbers and the duration of reservists' service. She said that the increased requirements are not distributed evenly across all communities; some Limited-Supply/High-Demand (LS/HD) skills are experiencing difficulties in meeting mission requirements. The Director, Manpower, Personnel, Training and Mobilization (N0951) asked CNA to develop metrics to measure and monitor the Reserve Component's capacity to meet LS/HD missions and to suggest strategies to mitigate manning shortfalls in these skills.

Dr. Golfin constructed a model that calculates various quarterly manpower metrics for a number of skills for the 2-year period of July 2005 to June 2007. These estimates are then used to calculate the ratio of the number of mobilizable reservists that will be available for each requirement in each quarter for the next 3 years. Working with the sponsor, they established a threshold of six mobilizable reservists for each requirement to indicate when a skill is LS/HD.

Dr. Golfin predicted the ratio for 42 enlisted ratings and 14 officer designators. According to these estimates, 31 of the 42 enlisted ratings and 4 officer designators either already are or will be LS/HD within the next 3 years in one or more paygrades. Dr. Golfin illustrated with the BU rating how the model can be used to conduct sensitivity analyses that change one demand- or supply-side element to see what would happen to the capacity if such a change occurred, and to help identify strategies to improve a skill's capacity.

Dr. Golfin recommended the following. Conduct sensitivity analyses on more LS/HD skills and calculate cost estimates. Determine the right "early warning" LS/HD ratio. Update ratios quarterly. Determine the effect of recent dwell policy on continuation. Analyze individual skills in more depth to examine the following: Why is retention in some skills so low? Is it possible to shorten the training path or get new recruits more active-duty time? Are incentives working? Are different ones required? Are Billets Authorized/mobilization requirements set correctly? Finally, improve mobilization data captured.

Figure 62. Using manpower estimate metrics to predict quarterly flows^a



a. Presented by Dr. Peggy Golfin (CNA) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

Career Impact of Active Duty Individual Augmentation

Dr. Peggy Golfin and Mr. Steve Belcher presented the results of their work on how Individual Augmentation assignments affect Service-member's careers. As the United States and coalition forces continue to prosecute the Global War on Terrorism (GWOT) and support other contingency operations around the world, the demand for Navy manpower to augment deployed forces from all services has increased dramatically. These manpower augmentation requirements represent unfunded, unplanned, but necessary allotments of Navy personnel to augment existing units and organizations so that Navy and Combatant Commanders can effectively perform their assigned missions. Active duty Sailors and officers who are pulled from their current commands and sent on Temporary Additional Duty (TAD) orders to fill these requirements are known as Individual Augmentees (IAs).

Dr. Golfin stated that CNA was asked to examine two issues concerning IA assignments. The first was to determine whether active duty personnel were disproportionately selected for IA assignments or were assigned to lengthier or more dangerous locations based on personal characteristics that are not material to the IA assignment itself. The second was whether IA assignments have affected the career progression of active duty Servicemembers. Of particular interest were the effects on retention, promotion, and sea/shore rotation.

The team said that it's difficult to identify AC Servicemembers who served on IA assignments because they are on TAD orders that are not captured in the Navy's personnel data systems. The team relied on PERS-463's Order Tracking File to identify those IA'd and used EMR/OMT data to add Servicemembers' characteristics, such as demographics, performance, and career progression. The research team conducted multivariate regression analysis to predict the probability of being IA'd. They performed separate analyses for each of the top six ratings, which included 52 percent of all IAs, and created one category for all others IA'd. They also controlled for assignment-specific requirements (security clearances, paygrades). The team looked for differences in the likelihood of being selected for IA assignment based on gender, race/ethnicity, quality (i.e., AFQT and speed to promotion), marital status/children, and time in Unit Identification Code (UIC) at time of deployment. The analysis predicted the relative probability of being IA'd for enlisted Sailors. They found that men were generally more likely to be IA'd and that, for some ratings, quality, family status, and race/ethnicity were significant factors in selection for an IA assignment. Advancement was analyzed by looking at E-4s through E-8s at time of deployment. The team followed Sailors 12 months after deploying/October 2004. They controlled for the effect of changing advancement policies. The analysis predicted the probability of promotion within 12 months. The results indicated that, while promotion differences that existed early in GWOT have been reduced, significant differentials continue at higher paygrades.

Officers were analyzed using the same general analysis as enlisted. About 2,200 regular AC were IA'd from FY04 to December 2006. The top six designators IA'd represent almost 52 percent of these. Over 80 percent of officers in these designators were on shore duty when they

were IA'd. The team conducted separate multivariate analysis to predict the relative probability of officers being IA'd while on shore duty and sea duty. They also examined whether IA'd officers were more likely to be passed over for promotion. When they controlled for relevant officer characteristics, they found that IA'd officers were generally more likely to be passed over for promotion than their non-IA'd peers, especially those who were on sea duty when they were selected for an IA assignment. The team noted that some important measures of performance may be missing, however.

Figure 63. Predicted and predicted relative probabilities of being IA'd^a

Predicted Relative Probability of Being IA'd: Officers on Shore Duty*

	CEC	JAG	NFO	Pilot	Supply	SWO	All other Officers
Men						6.9%	3.7%
Women relative to men						-43%	-38%
Whites						6.7%	
Black relative to whites						+22%	
Hispanics relative to whites						-12%	
All other races relative to whites						-67%	
Single		24.4%	13.3%	8.0%			4.0%
Married relative to single		-51%	-43%	-44%			-20%
Overall probability	18.1%	15.9%	8.7%	5.2%	11.3%	6.6%	3.4%

* Predicted probabilities shown in black, predicted relative probabilities shown in red and blue.

a. Presented by Dr. Peggy Golfin (CNA) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

In conclusion, Dr. Golfin reported that updated data have been received and that the team has requested data regarding enlisted promotion, including exam and evaluation scores. In addition, she stated that new promotion policies have been promulgated since October 2006.

Community and Strength Planning Models

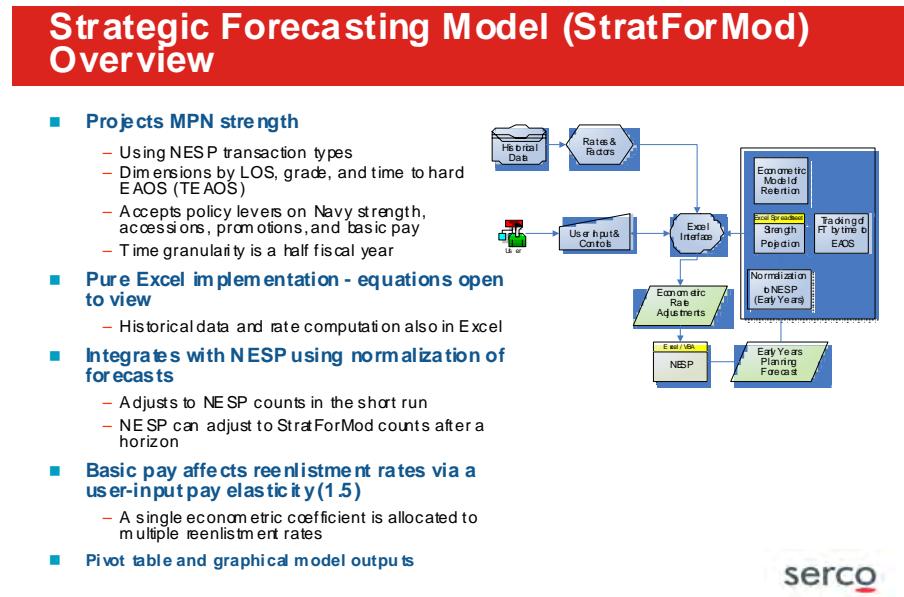
Evolution of the Navy's Strategic Strength Forecasting Model

Dr. Steve Wilcox (SERCO) presented the Strategic Forecasting Model (StratForMod), which provides the Department of the Navy personnel managers a tool to make long-term enlisted strength forecasts and evaluate the costs and benefits of various policy options, including pay changes. Dr. Wilcox said that as a model to help the analyst understand the forecast, it is somewhat unusual in that its calculations are transparently laid out step by step in Microsoft Excel. This facilitates the analysis and comparison of model results for continuing model validation and serves as a stepping stone to the understanding of a planned model that will have additional functionality, such as the occupational dimension. He said that, as an evolution of strength models at N-1 toward using one model for both strategic and planning purposes, it moves toward strengthening the predecessor strategic model in directions that increase its fit with short-term strength planning needs. It thus increases the distinctions between transaction types, considers time to EAOS, employs half-year time granularity, and harmonizes its forecast with the Navy Enlisted Strength Planning (NESP) model.

Dr. Wilcox said the first objective of the StratForMod is to increase the Navy's capability to perform integrated strategic and strength planning of manpower. This can be accomplished by developing budget submissions tied to policy decisions, analyzing the effect of policy adjustments, projecting impacts of force structure changes up to 15 years, and developing economic policy levers. The second objective is to produce a white-box model that links accession, promotion, separations, and force structure in a holistic manner. Third, the model allows rapid solutions for policy "wargaming." The StratForMod is able to project MPN strength. It uses pure Excel implementation. The model integrates with NESP using normalization of forecasts. A

user input pay elasticity (1.5) models basic pay effects on reenlistment rates. The model uses pivot table and graphical model outputs.

Figure 64. Components of the Strategic Forecasting Model (StratForMod)^a



StratForMod Overview

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a. Presented by Dr. Steve Wilcox (SERCO) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

According to Dr. Wilcox, the StatForMod accomplishments include long-term forecasting with econometric and planning model integration, open-box implementation to allow inspection of intermediate results, and movement toward an integrated planning/strategic model.

SKIPPER A-School Optimization by Paygrade

Dr. Chariya Punyanitya (CSC), Sanjay Nayar (CSC), Dr. Colin Osterman (NPRST), Angela Cho (CSC) began by discussing the reasons for interest in optimizing accessions by paygrade (PG). The research

team said that current emphasis on accession optimization by length of service (LOS) ignores PG. They said that official EPA is only by PG. Optimization by PG provides an alternative to managers as a comparison against LOS approach.

SKIPPER (Skilled Personnel Projection for Enlisted Retention) is a web-based open-box model. It has a powerful scenario and "what if" analysis capability to support Strategic Planning. SKIPPER provides a generalized and expandable modeling framework allowing multi-year inventory projection, personnel Master File-based historical data with override capability, school input optimization and skill conversion planning, and advancement, selective reenlistment bonus and rotation modeling. SKIPPER also offers a suite of reporting tools that includes Career Reenlistment Objectives (CREO), Scenario Comparison, and Skill Rollup to the All Navy Level.

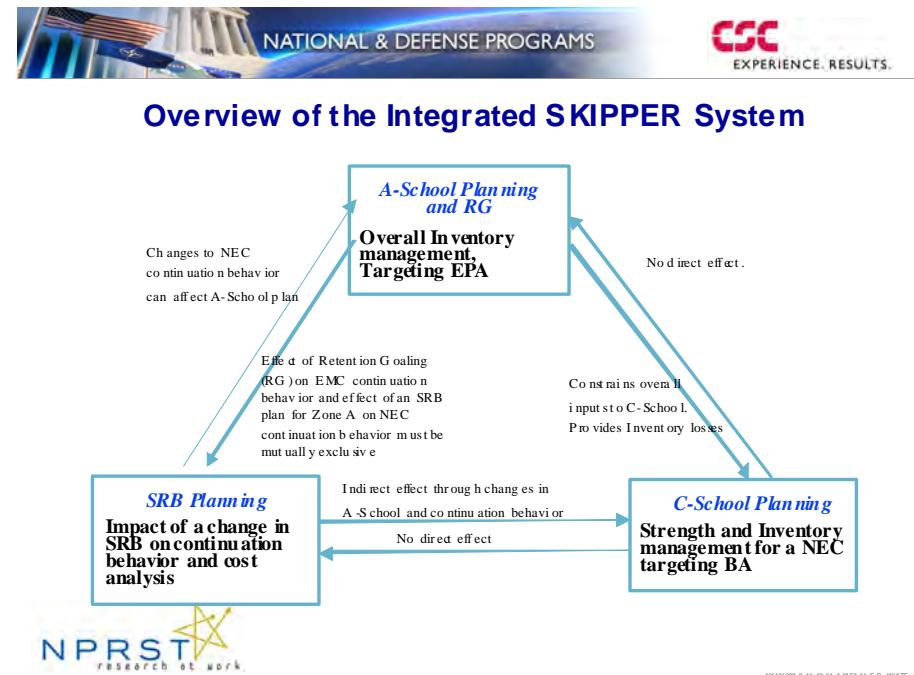
SKIPPER components can be used in any order. The system is holistic and all parts are executed together. Scenarios become the key to "what if" analysis. The model also divides areas of responsibility among components to minimize inconsistency.

The current capabilities of SKIPPER can be leveraged for PG optimization. First, SKIPPER models and forecasts Inventory (multiple dimensions, including LOS and PG). SKIPPER also models and forecasts advancements. In addition, users can explore what-if scenarios: Input based on overridden historic data. Finally, SKIPPER has accession planning functionality that includes total school input optimization, ability to optimize to hit EPA by LOS, and SKIPPER has EPA by PG or LOS.

Dr. Chariya Punyanitya and the research team presented three approaches and discussed the results using charts. Approach 1 involved linear optimization by PG. The approach optimized total gains to hit EPA by PG target. During this discussion, the analysts also discussed the issues with advancements distribution. Using a fixed advancements distribution can lead to problems because advancements are based on the underlying inventory, which changes as a result of continuation, and previous advancements under various constraints, and gains. They explained that, during a full SKIPPER projection, the actual advancements will be different from historic.

Approach 2 was iterative based on historic advancement PG distribution. Approach 3 was iterative PG optimization independent of historic advancement.

Figure 65. The integrated components of SKIPPER^a



a. Presented by Dr. Chariya Punyanitya (CSC), Sanjay Nayar (CSC), Dr. Colin Osterman (NPRST), and Angela Cho (CSC) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

In conclusion, Dr. Chariya Punyanitya said that PG optimization is worth pursuing focusing on accessions distribution and advancements distribution. She said that an iterative approach looks better than linear optimization since it utilizes the power of the full model, takes into account the changing nature of advancements under various constraints, and is less complex to implement.

Enterprise-Wide and Cross-Enterprise Modeling

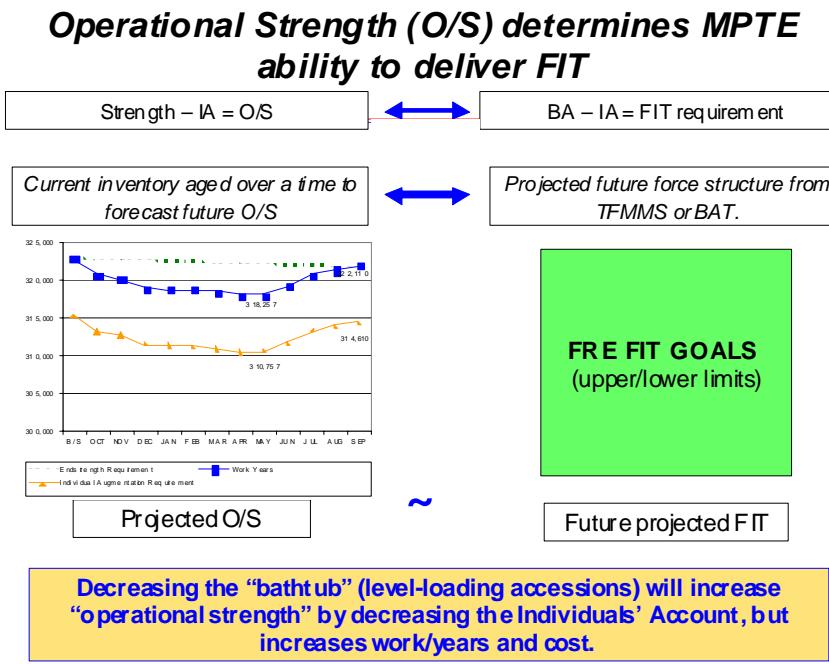
Integrated Operating Picture

Mr. Tony Cunningham (Navy MPTE) presented research on the need for Integrated Operating Picture (IOP). He began by stating that OPNAV N1 manages a \$27-billion annual budget that resources for the Navy's Manpower, Personnel, Training and Education (MPTE) business lines. This includes salaries, retirement accrual, training, education, and medical care—in essence, everything associated with Navy personnel. Mr. Cunningham said that N1 requires enterprise-wide visibility into each element of the organization to track force health and resource execution, but, more important, it requires the ability to assess the implication of decisions on future force structure and resources and the ability to analyze at a high level a range of alternatives to support decision-making.

According to Mr. Cunningham, the IOP concept was developed to (1) capture current enterprise metrics, (2) distill these metrics into information that N1 leadership can use for decision-making, and (3) provide an environment that enables N1 to assess alternative courses of action, evaluate the cost, risk, and schedule of the alternatives, and make informed force structure and resource decisions. The IOP will provide visibility into the impact of such decisions on current and future resources and readiness.

Mr. Cunningham said that key performance parameters and the metrics providing visibility into these measures are being defined and collected. Understanding and capturing the demand signal, as defined by the Navy enterprises through the respective performance agreements, is a critical, entering argument for establishing meaningful measures of the effectiveness of the MPTE enterprise. The IOP is in development and expected to be delivered and operational in FY08.

Figure 66. Using projected “operational strength” to determine the future projected FIT^a



a. Presented by Mr. Tony Cunningham (Navy MPTE), at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008

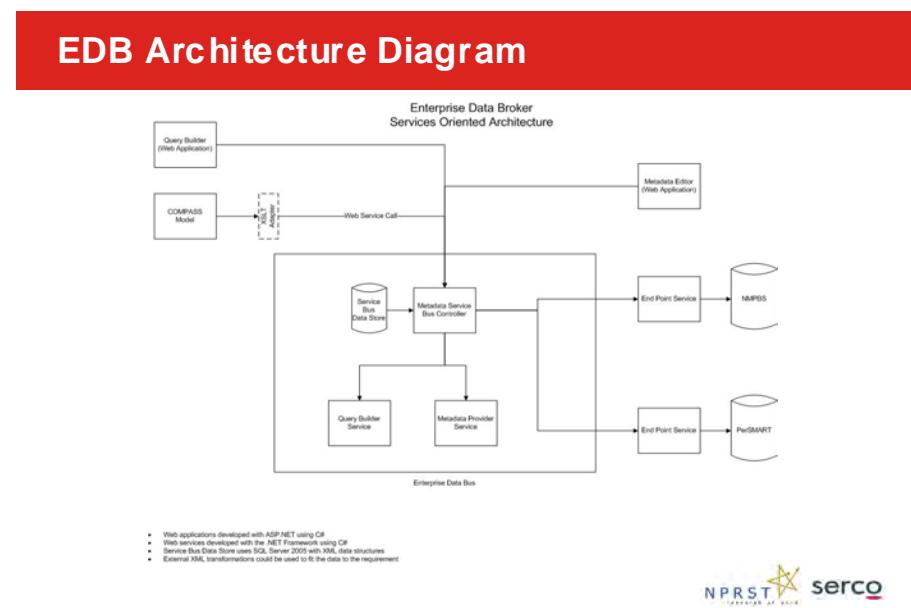
Enterprise Data Broker: An Approach to Data Consolidation Using a SOA-based Delivery System

Mr. Frank Vona (SERCO) started his presentation by stating that each organization in the personnel management network maintains independent operational and archival information technology systems. He said that each organization measures success locally, and, at times, each makes management decisions without fully understanding the impacts those decisions have on the extended enterprise. Mr. Vona said that, to overcome the inherent inefficiency of independently operating “stove-piped” organizations, the Enterprise Data Broker (EDB) was built to test the theory that a universal data bus could be used to integrate and standardize for decision-makers a line of business tool data requirements across the enterprise. He contends that

the ability to collect, analyze, and link data from the current stove-piped operational and archival data systems, and extract knowledge from the aggregated data, is the most critical element of the solution.

According to Mr. Vona, this broker service pulls data from disparate sources to allow a single point of reference for consumers of the information. He explained that the EDB is a virtual bus, or gateway, that could be replicated across several systems within the enterprise. Individual web services would be implemented at various sites within the Navy MPT&E community to provide standardized data services.

Figure 67. Service-oriented architecture of the EDB^a



a. Presented by Mr. Frank Vona (SERCO) at the Eighth Annual Navy Workforce Research and Analysis Conference, May 2008.

Mr. Vona said, in conclusion, that the key to controlling these services relies on the functionality of the EDB. No service will be declared an official Navy data source without conforming to the specification requirements of the EDB and obtaining formal authorization to be referenced by the EDB.

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List of figures

Figure 1. Strategic alignment of medical missions to country-centric health needs	6
Figure 2. Increased retention and cost-effectiveness	7
Figure 3. Breaks in service that may improve work/life balance and retention.	9
Figure 4. FIT & FILL measures are concise but are they enough?	10
Figure 5. Identifying Sailor's status at end of tour	12
Figure 6. Navy to O*NET crosswalk of occupations	14
Figure 7. M&S education for acquisition: requirements and design	15
Figure 8. The full approach CBCA process.	17
Figure 9. Phases of the AT&L competency management process	19
Figure 10. BAT Individual Augmentee (IA) billet computation process	22
Figure 11. Opportunities for optimal Sea-Shore rotations . . .	24
Figure 12. Analysis of task hours	25
Figure 13. Modeling team skill acquisition	28
Figure 14. Making more informed decisions about resource allocation and cost-benefits across units and battle groups	29

Figure 15. Decentralizing resource allocation decisions	30
Figure 16. Accessible, usable, tool for Total Force skill-person-job matching	32
Figure 17. Total Force surveys conducted through a lightning poll	33
Figure 18. Simulation model showing supply-chain inventory adjustments	36
Figure 19. FC (Aegis) force structure: paygrade, billets, and inventory	37
Figure 20. Battle scenario simulation results.	39
Figure 21. Variables used and results of logit model	42
Figure 22. Perceptions about the value of military QOL benefits.	44
Figure 23. Comparing military and civilian cash plus compensation benefits	45
Figure 24. Application of 2-Person Game Theory Approach . .	47
Figure 25. The one-to-one approach based on bilateral negotiations	48
Figure 26. Sailor optimal mechanism	50
Figure 27. Results produced by NEC selections	51
Figure 28. OPIS and Web Wolf combination provides comprehensive measures	53
Figure 29. Model of integrated workforce dynamics	55
Figure 30. Preliminary results of the Navy's diversity strategy.	58
Figure 31. Results for psychometric evaluation of relationships	59

Figure 32. Accessions needed to address the case for force diversity	62
Figure 33. Male vs. female ratings of separation factors.	64
Figure 34. Trends in racial discrimination experiences	65
Figure 35. Declining black Marine recruits	67
Figure 36. Strength effect size of Morale, Welfare and Recreation on key readiness variables	70
Figure 37. Demographics of the 2006 Survey of Spouses	71
Figure 38. Examining ideas and initiatives for life/work balance.	74
Figure 39. EFMP customer service components.	75
Figure 40. Active duty spouses rate importance of work/family life balance	77
Figure 41. Supply chain processing from street to fleet.	80
Figure 42. The street-to-fleet process and key pipeline points	82
Figure 43. The framework approach and technique	84
Figure 44. MILITAPS Cumulative Sailor Report.	86
Figure 45. Dimensions of the scenarios	88
Figure 46. Task requirements, results, and use	90
Figure 47. SME inputs for validation prototype workforce analysis model	92
Figure 48. Scenario simulations in action	93
Figure 49. Hearing loss as a function of years of exposure . . .	96
Figure 50. Early integration is the least expensive and most effective way to manage program life cycle	98

Figure 51. Chart of injury type	100
Figure 52. Hearing loss statistics	101
Figure 53. NCAP success traits and Five Factor Model	104
Figure 54. Task proficiency in baseline and emergency conditions	106
Figure 55. Cost savings impact for reduced character deficiencies	107
Figure 56. Generated tasks measured through survey.	109
Figure 57. The state of SEAL production in early FY06	112
Figure 58. Modeling behavioral impact on recruits in light of the economy	114
Figure 59. Labor force demands push generational issues to the table	116
Figure 60. Impact of policy variables on performance measures	118
Figure 61. Model of enlisted retention rates by pay grade . . .	120
Figure 62. Using manpower estimate metrics to predict quarterly flows	122
Figure 63. Predicted and predicted relative probabilities of being IA'd.	124
Figure 64. Components of the Strategic Forecasting Model (StratForMod)	126
Figure 65. The integrated components of SKIPPER	128
Figure 66. Using projected “operational strength” to determine the future projected FIT	130
Figure 67. Services-oriented architecture of the EDB	131

